

Mind the Gap: why do people act environmentally and what are the barriers to pro-environmental behavior?

ANJA KOLLMUSS & JULIAN AGYEMAN *Tufts University, Medford, MA, USA*

SUMMARY Numerous theoretical frameworks have been developed to explain the gap between the possession of environmental knowledge and environmental awareness, and displaying pro-environmental behavior. Although many hundreds of studies have been undertaken, no definitive explanation has yet been found. Our article describes a few of the most influential and commonly used analytical frameworks: early US linear progression models; altruism, empathy and prosocial behavior models; and finally, sociological models. All of the models we discuss (and many of the ones we do not such as economic models, psychological models that look at behavior in general, social marketing models and that have become known as deliberative and inclusionary processes or procedures (DIPS)) have some validity in certain circumstances. This indicates that the question of what shapes pro-environmental behavior is such a complex one that it cannot be visualized through one single framework or diagram. We then analyze the factors that have been found to have some influence, positive or negative, on pro-environmental behavior such as demographic factors, external factors (e.g. institutional, economic, social and cultural) and internal factors (e.g. motivation, pro-environmental knowledge, awareness, values, attitudes, emotion, locus of control, responsibilities and priorities). Although we point out that developing a model that tries to incorporate all factors might neither be feasible nor useful, we feel that it can help illuminate this complex field. Accordingly, we propose our own model based on the work of Fliegenschnee and Schelakovsky (1998) who were influenced by Fietkau and Kessel (1981).

Introduction

Environmental psychology, which developed in the US in the 1960s, looks at the range of complex interactions between humans and the environment. It is

therefore a very broad field with many branches. The branch that looks at the psychological roots of environmental degradation and the connections between environmental attitudes and pro-environmental behaviors is part of environmental psychology but does not have a separate name in English. In German this field is called *Umweltpsychologie* [1].

Over the last 30 years many psychologists and sociologists have explored the roots of direct and indirect environmental action [2]. The answer to the questions: 'Why do people act environmentally and what are the barriers to pro-environmental behavior?' is extremely complex. By 'pro-environmental behavior' we simply mean behavior that consciously seeks to minimize the negative impact of one's actions on the natural and built world (e.g. minimize resource and energy consumption, use of non-toxic substances, reduce waste production).

Numerous theoretical frameworks have been developed to explain the gap between the possession of environmental knowledge and environmental awareness, and displaying pro-environmental behavior. Although many hundreds of studies have been done, no definitive answers have been found. Our article describes a few of the most influential and commonly used frameworks for analyzing pro-environmental behavior. These are: early US linear progression models; altruism, empathy and prosocial behavior models; and finally, sociological models. We then analyze the factors that have been found to have some influence, positive or negative, on pro-environmental behavior such as demographic factors, external factors (e.g. institutional, economic social and cultural factors) and internal factors (e.g. motivation, environmental knowledge, awareness, values, attitudes, emotion, locus of control, responsibilities and priorities). We present this article in order to give environmental educators a feel for some of the broader research findings which have informed current environmental education theory and practice. In doing so, we do not want to prescribe or constrain, but to open up a dialogue regarding the most effective ways environmental educators might help develop pro-environmental behavior at all levels in society.

In this article, we do not discuss recent (and very promising) advances in community social marketing for sustainability (see Agyeman and Angus, forthcoming). Social marketing techniques have been widely used in the field of public health, in anti-smoking campaigns, AIDS awareness campaigns, and to encourage the treatment of leprosy. The development of community-based social marketing specifically for sustainability arose out of concerns about the ineffectiveness of environmental campaigns that relied solely on providing information. The pragmatic approach of social marketing has been offered as an alternative to conventional campaigns, and, in contrast to traditional education methods, has been shown to be very effective at bringing about behavior change (McKenzie-Mohr & Smith 1999, p. 15). McKenzie-Mohr and Smith (1999) claim that the primary advantage of social marketing is that it starts with people's behavior and works backward to select a particular tactic suited for that behavior (McKenzie-Mohr & Smith 1999, p. 7). The research on community-based social marketing indicates that the approach has been successful in transcending the gap between knowledge to action that has characterized many local environmental and sustainability projects to date.

Similarly, we do not discuss recent work by O'Riordan and Burgess (1999) and Owens (2000) on deliberative and inclusionary procedures (DIPS) which is

showing that 'such [information-based] approaches have repeatedly been shown, by experience, and in research, to be flawed, and a growing body of opinion points instead towards the need for more deliberative and inclusionary procedures' (Owens, 2000, p. 1141). Bloomfield *et al.* argue that DIPS, which includes citizen's juries and round tables, should be seen as a significant, even essential ingredient in the development of more responsive forms of decision making capable of accounting for the diversity of values and opinions within societies (Bloomfield *et al.*, 1998, p. 2). The authors write that DIPS are not 'to be seen merely as a mechanism of achieving greater understanding, or even consensus, over environmental issues within a fragmenting civil society ... but to have "transformative" potential allowing those with no or weak voice to exert influence on decision making outcomes (Bloomfield *et al.*, 1998, p. 2).

In conclusion, we propose our own visual model based on the work of Fliegenschnee and Schelakovsky (1998) who were influenced by Fietkau and Kessel (1981).

Review of Selected Frameworks for Analyzing Pro-environmental Behavior

Early US Linear Models

The oldest and simplest models of pro-environmental behavior were based on a linear progression of environmental knowledge leading to environmental awareness and concern (environmental attitudes), which in turn was thought to lead to pro-environmental behavior. These rationalist models assumed that educating people about environmental issues would automatically result in more pro-environmental behavior, and have been termed (information) 'deficit' models of public understanding and action by Burgess *et al.* (1998, p. 1447).



FIG. 1. Early models of pro-environmental behavior.

These models from the early 1970s were soon proven to be wrong. Research showed that in most cases, increases in knowledge and awareness did not lead to pro-environmental behavior. Yet today, most environmental Non-governmental Organisations (NGOs) still base their communication campaigns and strategies on the simplistic assumption that more knowledge will lead to more enlightened behavior. Owens (2000) points out that even governments use this assumption, for example the UK government's 'Save It' energy conservation campaign in the mid-1970s, and the 'Are You Doing Your Bit?' campaign which was launched in 1998 to develop public understanding of sustainable development. This reliance on information to drive change is surprising because common sense tells us that changing behavior is very difficult. Anyone who has ever tried to change a habit, even in a very minor way, will have discovered how difficult it is, even if the new behavior has distinct advantages over the old one.

As mentioned, quantitative research has shown that there is a discrepancy

between attitude and behavior. Many researchers have tried to explain this gap. Rajecki (1982) defined four causes:

- *Direct versus indirect experience*: Direct experiences have a stronger influence on people's behavior than indirect experiences. In other words, indirect experiences, such as learning about an environmental problem in school as opposed to directly experiencing it (e.g. seeing the dead fish in the river) will lead to weaker correlation between attitude and behavior.
- *Normative influences*: Social norms [3], cultural traditions, and family customs influence and shape people's attitudes, e.g. if the dominant culture propagates a lifestyle that is unsustainable, pro-environmental behavior is less likely to occur and the gap between attitude and action will widen.
- *Temporal discrepancy*: Inconsistency in results occur when data collection for attitudes and data collection for the action lie far apart (e.g. after Chernobyl, an overwhelming majority of Swiss people were opposed to nuclear energy; yet a memorandum two years later that put a 10-year halt to building any new nuclear reactors in Switzerland was approved by only a very narrow margin). Temporal discrepancy refers to the fact that people's attitudes change over time.
- *Attitude-behavior measurement*: Often the measured attitudes are much broader in scope (e.g. Do you care about the environment?) than the measured actions (e.g. Do you recycle?). This leads to large discrepancies in results (Newhouse, 1991).

The last two items point out frequent flaws in research methodology and make it clear how difficult it is to design valid studies that measure and compare attitude and behavior. Ajzen and Fishbein addressed these issues of measurement discrepancies in their *Theory of Reasoned Action* and their *Theory of Planned Behavior* (Fishbein & Ajzen, 1975; Ajzen & Fishbein, 1980).

They pointed out that in order to find a high correlation between attitude and behavior the researcher has to measure the attitude toward that particular behavior. For example, comparing attitudes toward climate change and driving behavior usually shows no correlation. Even people who are very concerned about climate change tend to drive. This is because the attitude toward climate change is not closely related to the behaviour (driving). More narrowly targeted attitude measurements lead to a higher correlation but much of the information is lost (Lehmann, 1999). In other words it is rather meaningless to discover that someone who has a negative attitude towards walking in the rain will choose to drive his car.

Fishbein and Ajzen maintain that people are essentially rational, in that they 'make systematic use of information available to them' and are not 'controlled by unconscious motives or overpowering desires', neither is their behavior 'capricious or thoughtless' (Ajzen & Fishbein, 1980, introduction; see also Fishbein & Ajzen, 1975, p. 15). Attitudes do not determine behavior directly, rather they influence behavioral intentions which in turn shape our actions. Intentions are not only influenced by attitudes but also by social ('normative') pressures. Thus 'the ultimate determinants of any behavior are the behavioral beliefs concerning its consequences and normative beliefs concerning the prescriptions of others' (Ajzen & Fishbein, 1980, p. 239).

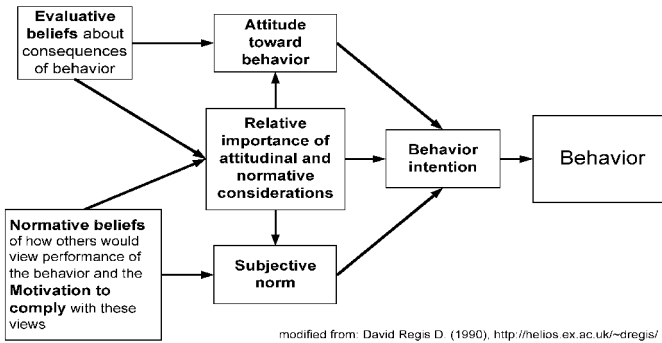


FIG. 2. Theory of reasoned action (Ajzen & Fishbein, 1980).

Their model has been the most influential attitude-behavior model in social psychology—probably because they developed a mathematical equation that expressed their model which led researchers to conduct empirical studies. Although the model certainly has its limitations—for example the underlying assumption that people act rationally—it is useful because of its clarity and simplicity (Regis, 1990).

In 1986, Hines, Hungerford and Tomera published their *Model of Responsible Environmental Behavior* which was based on Ajzen and Fishbein's theory of planned behavior (Hines *et al.*, 1986–87; Hungerford & Volk 1990; Sia *et al.* 1985–86). They did a meta-analysis of 128 pro-environmental behavior research studies and found the following variables associated with responsible pro-environmental behavior:

- *Knowledge of issues*: The person has to be familiar with the environmental problem and its causes.
- *Knowledge of action strategies*: The person has to know how he or she has to act to lower his or her impact on the environmental problem.
- *Locus of control*: This represents an individual's perception of whether he or she has the ability to bring about change through his or her own behavior. People with a strong internal locus of control believe that their actions can bring about change. People with an external locus of control, on the other hand, feel that their actions are insignificant, and feel that change can only be brought about by powerful others.
- *Attitudes*: People with strong pro-environmental attitudes were found to be more likely to engage in pro-environmental behavior, yet the relationship between attitudes and actions proved to be weak.
- *Verbal commitment*: The communicated willingness to take action also gave some indication about the person's willingness to engage in pro-environmental behavior.
- *Individual sense of responsibility*: People with a greater sense of personal responsibility are more likely to have engaged in environmentally responsible behavior.

Although the framework is more sophisticated than Ajzen and Fishbein's (1980), the identified factors do not sufficiently explain pro-environmental behavior. The relationship between knowledge and attitudes, attitudes and

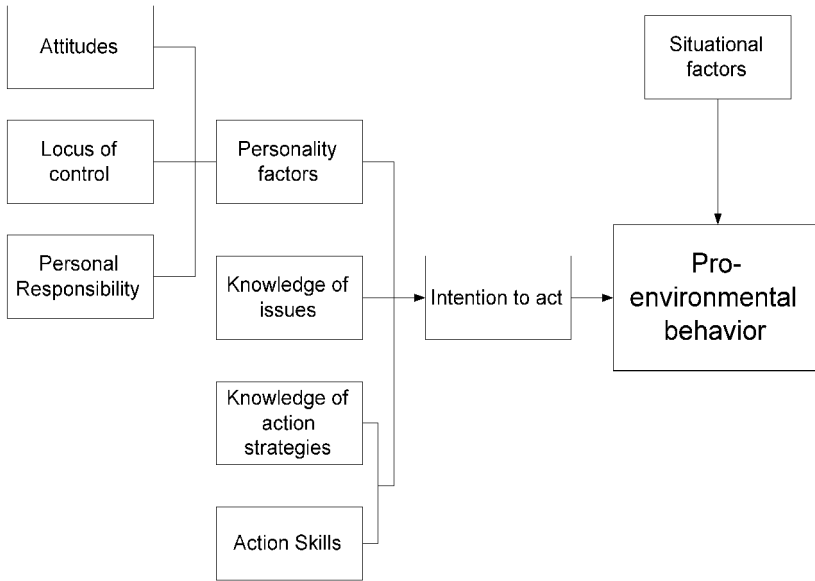


FIG. 3. Models of predictors of environmental behavior (Hines *et al.*, 1986).

intentions, and intentions and actual responsible behavior, are weak at best. There seem to be many more factors that influence pro-environmental behavior. Hines *et al.* (1986–87) called these ‘situational factors’ which include economic constraints, social pressures, and opportunities to choose different actions.

Altruism, Empathy, and Prosocial Behavior Models

Models of altruism, empathy, and prosocial behavior are another framework for analyzing pro-environmental behavior. Prosocial behavior is defined by Eisenberg and Miller (1987) as ‘voluntary intentional behavior that results in benefits for another: the motive is unspecified and may be positive, negative, or both’ (quoted in Lehmann, 1999, p. 33). Altruism is a subset of prosocial behavior. Borden and Francis (1978, as noted in Lehmann, 1999, p. 34) hypothesize that:

1. Persons with a strong selfish and competitive orientation are less likely to act ecologically;
2. People who have satisfied their personal needs are more likely to act ecologically because they have more resources (time, money, energy) to care about bigger, less personal social and pro-environmental issues.

The second assumption underlies many other studies and models (e.g. Maslow’s hierarchy of human needs). For example, it is often claimed that people in poorer countries care less about the environment, yet the study by Diekmann and Franzen (1999) shows that the issue is more complicated. Using data from two different surveys they showed that when people from poorer countries are asked to *rank* the most pressing problems, environmental issues are indeed ranked lower. Yet if the people are asked to *rate* the severity of different problems, pro-environmental issues always rank high, no matter if the country is affluent or poor. Ranking therefore reflects more the reality of scarce economic

resources and not the lack of environmental concern of less affluent people. In addition, 'ecological footprinting' (Wackernagel & Rees, 1997) and similar measures of resource consumption, such as 'environmental space' (McLaren *et al.*, 1998) show clearly that richer nations have a far greater negative environmental impact than poorer nations. This of course does not mean that poorer nations limit their ecological footprint out of environmental concern but it does show that more affluence does not lead to more ecological behavior (for an additional example see also endnote 4).

Several other researchers base their models and assumptions on theories of altruism, claiming that altruism is needed or at least supports pro-environmental behavior. Of note is the work of Allen and Ferrand (1999) who recently tested the 'actively caring' hypothesis of Geller. Similar to the altruism theory of Schwartz (1977), Geller hypothesized that in order to act pro-environmentally, individuals must focus beyond themselves and be concerned about the community at large. Geller suggested that this state of 'actively caring' can only occur if the need for self-esteem, belonging, personal control, self-efficacy, and optimism have been satisfied. In their study Allen and Ferrand (1999) found that self-esteem and belonging were not related to pro-environmental behavior but that there was a significant relationship between personal control and sympathy, their measure for 'actively caring'. They did not test for optimism or self-efficacy.

Stern *et al.*'s (1993) model is based on the altruism theory of Schwartz (1977). This theory assumes that altruistic behavior increases when a person becomes aware of other people's suffering and at the same time feels a responsibility of alleviating this suffering. Stern *et al.* expand this notion and include, next to this 'altruistic' orientation, which they call 'social orientation', an 'egoistic' and a 'biospheric orientation'. The social orientation is concerned with the removal of suffering of other people, the egoistic orientation is concerned with the removal of suffering and harm from oneself, and the biospheric orientation is concerned with the removal of destruction and suffering in the non-human world. Every person has all three orientations but in different strengths. Whereas a deep ecologist might have a very developed biospheric orientation, a physician might have a stronger social orientation. Stern *et al.* propose that environmental concern is caused by a combination of these three factors:

$$\text{Motivation} = V (\text{egoistic orientation}) + V (\text{social orientation}) + V (\text{biospheric orientation})$$

They found, not surprisingly, that the egoistic orientation is the strongest orientation, followed by social and then biospheric concern (Stern *et al.*, 1993, quoted in Lehmann, 1999). On the surface, their model therefore contradicts Borden and Francis's (1978) altruism hypothesis mentioned above since Stern *et al.* (1993) claim that the stronger the egoistic orientation the stronger the motivation for the behavior. Yet the egoistic orientation can only be a motivator for pro-environmental behavior as long as the action serves the person's needs and wants (e.g. taking the train instead of the car to have time to relax and read). A strong egoistic orientation is counterproductive when the desired behavior negates a person's needs and desires (e.g. not flying to the tropics for a vacation). The models are therefore not contradictory; they just approach the issue from a different point.

Sociological Models for Analyzing Pro-environmental Behavior

Fietkau and Kessel (1981) use sociological as well as psychological factors to explain pro-environmental behavior or the lack of it. Their model comprises five variables that influence either directly or indirectly pro-environmental behavior. These variables are independent from each other and can be influenced and changed.

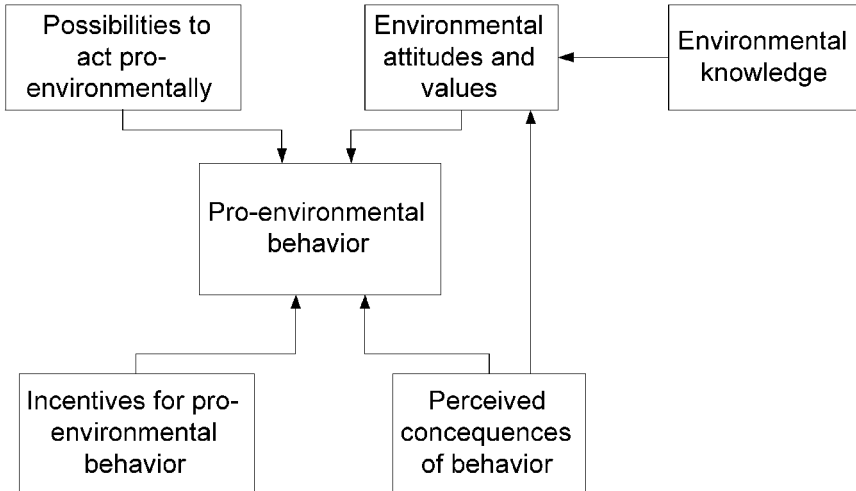


FIG. 4. Model of ecological behavior (Fietkau & Kessel, 1981).

- *Attitude and values (Einstellung und Werte).*
- *Possibilities to act ecologically [4] (Verhaltensangebote).* These are external, infrastructural and economic factors that enable or hinder people to act ecologically.
- *Behavioral incentives (Handlungsanreize).* These are more internal factors that can reinforce and support ecological behavior (e.g. social desirability, quality of life, monetary savings).
- *Perceived feedback about ecological behavior (wahrgenommene Konsequenzen).* A person has to receive a positive reinforcement to continue a certain ecological behavior. This feedback can be intrinsic (e.g. satisfaction of 'doing the right thing'), or extrinsic (e.g. social: not littering or recycling are socially desirable actions; and economic: receiving money for collected bottles).
- *Knowledge (Wissen).* In Fietkau's model, knowledge does not directly influence behavior but acts as a modifier of attitudes and values.

Blake (1999) talks about the attitude-behavior gap as the *Value-Action Gap*. He points out that most pro-environmental behavior models are limited because they fail to take into account individual, social, and institutional constraints and assume that humans are rational and make systematic use of the information available to them. A new set of research, mostly by sociologists as opposed to psychologists, has tried to address these limitations. Blake uses a quote from Redclift and Benton to summarize this new approach:

One of the most important insights which the social scientist can offer in the environmental debate is that the eminently rational appeals on

the part of environmentalists for 'us' to change our attitudes or lifestyles, so as to advance a general 'human interest' are liable to be ineffective. This is not because ... 'we' are irrational, but because the power to make a significant difference, one way or the other, to global or even local environmental change, is immensely unevenly distributed. This new body of research points out that people's values are 'negotiated, transitory, and sometimes contradictory'. (Redclift & Benton, 1994, pp. 7–8, quoted in Blake, 1999)

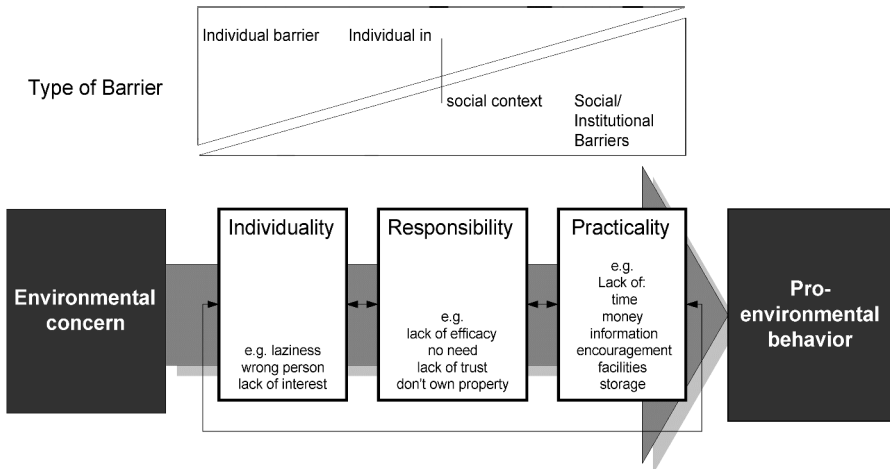


FIG. 5. Barriers between environmental concern and action (Blake, 1999).

Blake identifies three barriers to action: individuality, responsibility, and practicality. Individual barriers are barriers lying within the person, having to do with attitude and temperament. He claims that these barriers are especially influential in people that do not have a strong environmental concern. Environmental concern is therefore outweighed by other conflicting attitudes. However, in our experience, even a strong environmental concern can be overcome by stronger desires and needs. For example, our need to fly from the US to visit our families in Europe each year overrides our feelings of responsibility about keeping our air travel to a minimum to minimize global warming. Blake's second set of barriers, responsibility, is very close to the psychologist's notion of 'locus of control'. People who don't act pro-environmentally feel that they cannot influence the situation or should not have to take the responsibility for it. He points out that in the particular community he is describing, a lack of trust in the institution often stops people from acting pro-environmentally—since they are suspicious of local and national government, they are less willing to follow the prescribed actions.

The third barrier, practicality, Blake defines as the social and institutional constraints that prevent people from acting pro-environmentally regardless of their attitudes or intentions. He lists such constraints as lack of time, lack of money, and lack of information. Although his model is very useful in that it combines external and internal factors and describes both in some detail, he does not account for social factors such as familial pressures and cultural norms nor

does he explore in more depth the underlying psychological factors (e.g. what are the underlying factors of 'not having time'?).

Analysis: commonalities, contradictions and omissions

We have discussed only a few of the many different models that have been developed to explain the attitude–action gap and investigate the barriers to pro-environmental behavior. All of the models we have discussed (and many of the ones we did not, such as economic models, psychological models that look at behavior in general, social marketing models and DIPS) have some validity in certain circumstances. This indicates that the question of what shapes pro-environmental behavior is such a complex one that it cannot be visualized in one single framework or diagram. Such a single diagram with all the factors that shape and influence behavior would be so complicated that it would lose its practicality and probably even its meaning. Yet, as we show, there are commonalities, contradictions, and omissions that can be found in the different models. In the following section we discuss in more detail the specific factors that have been established as having some influence (positive or negative) on the models of pro-environmental behavior which we have selected in this article.

The distinctions and the hierarchy between the different influential factors are to some extent arbitrary. For example, we distinguish between the following factors: demographic factors, external factors (e.g. institutional, economic, social, and cultural factors) and internal factors (e.g. motivation, environmental knowledge, awareness, values, attitudes, emotion, locus of control, responsibilities, and priorities). A valid argument could be made that environmental knowledge is a subcategory of environmental awareness (as does Grob, 1991) and that emotional involvement is what shapes environmental awareness and attitude. This difficulty in defining and delimiting the different factors is due to the fact that most are broadly and vaguely defined, interrelated, and often do not have clear boundaries.

Demographic Factors

Two demographic factors that have been found to influence environmental attitude and pro-environmental behavior are gender and years of education. Women usually have a less extensive environmental knowledge than men but they are more emotionally engaged, show more concern about environmental destruction, believe less in technological solutions, and are more willing to change (Fliegenschnee & Schelakovsky, 1998; Lehmann, 1999). The longer the education, the more extensive is the knowledge about environmental issues. Yet more education does not necessarily mean increased pro-environmental behavior (see endnote 4).

External Factors

Institutional factors. Many pro-environmental behaviors can only take place if the necessary infrastructure is provided (e.g. recycling, taking public transportation). The poorer such services are the less likely people are to use them. These institutional barriers (e.g. lack of public transportation) can be overcome primar-

ily through people's actions as citizens (indirect environmental actions). Because of this, it is important to explore how environmental attitudes influence indirect environmental action. It might be true that environmental knowledge and environmental attitude have a more powerful influence on people's indirect actions than on people's direct pro-environmental behaviors. (See detailed discussion in the section on attitudes and values.)

Economic factors. Economic factors have a strong influence on people's decisions and behavior. Some economic research indicates that people make purchasing decision using a 50% or higher interest rate. In other words, if the person decides between two possible items, one energy-efficient and the other not, he or she will only choose the energy efficient item if the payback time for the energy saved is very short. The economic factors that play into people's decision are very complex and only poorly understood. From our own experience, the economist's assumption that people act in an economically rational fashion is very often not true. Yet people can be influenced by economic incentives to behave pro-environmentally (e.g. the Massachusetts Bottle Bill is responsible for the very high recycling rate of bottles at over 80% compared to an overall recycling rate of less than 10% in Boston, Massachusetts). The opposite is also true. Until recently, very low prices for heating oil in the US prevented people from taking energy conservation measures.

Economic factors are clearly very important when designing new policies and strategies that are meant to influence and change people's behavior. Nevertheless, predicting people's behavior on purely economic grounds will not reveal the whole picture. Economic factors are intertwined with social, infrastructural, and psychological factors. How else could we explain the different effects of pay-per-bag policies [5]: In some communities, the bag fees did nothing to reduce the weight of disposed material and increased the recycling rates only slightly (Ackerman, 1997). In others, a similar bag fee led to a chain reaction: people started unwrapping their groceries in the supermarket which in turn led the supermarkets to redesign and reduce their packaging to a minimum level. In these communities, the per capita reduction of garbage was quite significant.

Social and cultural factors. Cultural norms play a very important role in shaping people's behavior. Boehmer-Christiansen and Skea (1991) explored the history of policy reactions to acid rain in Germany and the UK. They showed that the high cultural value of the forests in Germany, along with its geographic position and the Germans' strong need for security and stability, led to a drastically different approach to the problem. It would be very interesting to design a cross-cultural study that looks at pro-environmental behavior. We would hypothesize that cultures in small, highly populated countries such as Switzerland and the Netherlands tend to be more resource conscientious than societies in large, resource-rich countries such as the USA.

Internal Factors

Motivation. Motivation is the reason for a behavior or a strong internal stimulus around which behavior is organized (Wilkie, 1990, as quoted in Moisander, 1998). Motivation is shaped by intensity and direction (which determines which behavior is chosen from all the possible options). Motives for behavior can be

overt or hidden—conscious or unconscious. Researchers distinguish between primary motives (the larger motives that let us engage in a whole set of behaviors, e.g. striving to live an environmental lifestyle and selective motives (the motives that influence one specific action), e.g. Should I bike to work today, even though it rains, or do I drive? (Moisander, 1998). Barriers, on the other hand, stifle certain behavior. Usually internal barriers to pro-environmental behavior are non-environmental motivations that are more intense and directed differently (e.g. I will drive to work because I'd rather be comfortable than environmentally sound). In this example, the primary motives (environmental values) are overridden by the selective motives (personal comfort).

As this example indicates, we hypothesize that primary motives, such as altruistic and social values, are often covered up by the more immediate, selective motives, which evolve around one's own needs (e.g. being comfortable, saving money and time). Similarly, Preuss distinguishes between an 'abstract willingness to act', based on values and knowledge and a 'concrete willingness to act', based on habits (Preuss, 1991).

Environmental knowledge. Most researchers agree that only a small fraction of pro-environmental behavior can be directly linked to environmental knowledge and environmental awareness. There are a few studies that claim otherwise (e.g. Grob, 1991 and Kaiser *et al.*, 1999), yet these studies test only very specific behavior that does not seem to be generalizable. At least 80% of the motives for pro-environmental or non-environmental behavior seem to be situational factors and other internal factors (Fliegenschnee & Schelakovsky, 1998).

This argument is further strengthened by the study of Kempton *et al.* (1995). They surveyed different groups in the US, ranging from strong environmentalists to those they thought were strong anti-environmentalists. Kempton found the average knowledge about environmental issues to be low. Surprisingly, the lack of knowledge was equally strong among environmentalists and non-environmentalists. His study therefore implies that environmental knowledge *per se* is not a prerequisite for pro-environmental behavior.

It might be necessary to distinguish between different levels of knowledge. Clearly, people have to have a basic knowledge about environmental issues and the behaviors that cause them in order to act pro-environmentally in a conscious way. Whereas Kempton *et al.*'s study indicated that most people do not know enough about environmental issues to act in an environmentally responsible way, other studies have shown that very detailed technical knowledge does not seem to foster or increase pro-environmental behavior (Diekmann & Preisendoerfer, 1992; Fliegenschnee & Schelakovsky, 1998).

It is interesting to note that other incentives (e.g. economic advantages) and cultural values can motivate people to act pro-environmentally without doing it out of environmental concern. Ecological economists like to take advantage of this fact. By imposing taxes on environmentally harmful activities, people will automatically move away from these behaviors and look for less damaging alternatives. For example, in countries with high gasoline tax, people tend to drive significantly less than in countries with very low taxes (Von Weizaecker & Jesinghaus, 1992). Yet some people caution that such unconscious pro-environmental behavior can easily be reversed or changed to a more unsustainable pattern because it is not based on some fundamental values (Preuss, 1991).

For instance, in China, people traveling in trains were used to disposing of their food and drinking utensils by throwing them out of the window. Formerly, this habit made perfect sense, since the drinking cups and the packaging were out of clay and other organic materials. More recently, these have been replaced by styrofoam and plastics. China now has a serious littering problem because people are still disposing of these new, non-degradable materials in the same way.

Values. Values are responsible for shaping much of our intrinsic motivation. The question of what shapes our values is a complex one. Fuhrer *et al.* (1995) proposed the following hypothesis: A person's values are most influenced by the 'microsystem', which is comprised of the immediate social net—family, neighbors, peer-groups, etc. Values are influenced to a lesser extent by the 'exosystem' such as the media and political organizations. Least strong, but nevertheless important, is the influence of the 'macrosystem', the cultural context in which the individual lives (Fuhrer *et al.*, 1995, as quoted in Lehmann, 1999).

One way to explore the determining factors that shape environmental values is to study the life experiences that have shaped the beliefs and values of active environmentalists (see *Environmental Education Research* special issues on significant life experiences in Volumes 4(4) and 5(4)). A few researchers have approached the topic from this side and have studied environmentalist's life histories.

Chawla interviewed numerous professional environmentalists in the USA and in Norway about the experiences and people who shaped and influenced their decisions to become environmentalists. Furthermore, she reviewed previous studies that had been done on formative life experiences of environmentalists. In her study, she explored retrospectively what factors influenced people's environmental sensitivity. She defines environmental sensitivity as 'a predisposition to take an interest in learning about the environment, feeling concern for it, and acting to conserve it, on the basis of formative experiences' (Chawla, 1998). Not surprisingly, she finds that there is no single experience that sensitizes people's awareness but a combination of factors. Among the most frequently mentioned (decreasing in relevance) are:

- Childhood experiences in nature
- Experiences of pro-environmental destruction
- Pro-environmental values held by the family
- Pro-environmental organizations
- Role models (friends or teachers)
- Education.

During childhood, the most influential were experiences of natural areas and family; during adolescence and early adulthood, education and friends were mentioned most frequently; and during adulthood, it was pro-environmental organizations (Chawla, 1999).

It is important to note that Chawla did not explore the factors that foster direct pro-environmental behavior but indirect pro-environmental actions. Her interviewees were very active environmental professionals, yet their commitment to indirect environmental activism does not necessarily mean that these people exhibited increased direct pro-environmental behavior. Nevertheless her studies

are valuable in that they show how important an emotional connection to the natural environment seems to be in fostering environmental awareness and environmental concern.

Attitudes. Attitudes are defined as the enduring positive or negative feeling about some person, object, or issue. Closely related to attitudes are beliefs, which refer to the information (the knowledge) a person has about a person, object, or issue (Newhouse, 1991).

Environmental attitudes have been found to have a varying, usually very small impact on pro-environmental behavior. This is unexpected because we tend to assume that people live according to their values. Diekmann and Preisendoerfer (1992) explain the discrepancy between environmental attitude and pro-environmental behavior by using a low-cost/high-cost model.

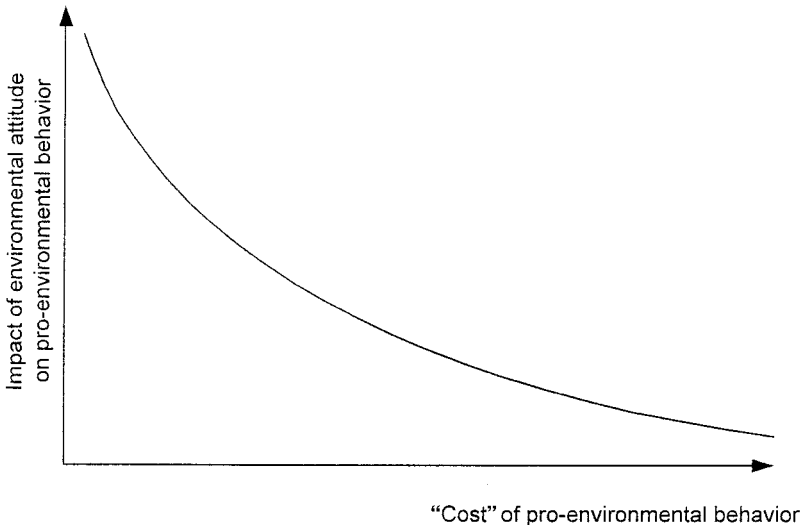


FIG. 6. Low-cost high-cost model of pro-environmental behavior (Diekmann & Preisendoerfer).

They propose that people choose the pro-environmental behaviors that demand the least cost. Cost in their model is not defined in a strictly economic sense but in a broader psychological sense that includes, among other factors, the time and effort needed to undertake a pro-environmental behavior. In their study they show that environmental attitude and low-cost pro-environmental behavior (e.g. recycling) do correlate significantly. People who care about the environment tend to engage in activities such as recycling but do not necessarily engage in activities that are more costly and inconvenient such as driving or flying less. In other words, a positive environmental attitude can directly influence low-cost pro-environmental behavior [6]. These findings might be less disappointing than they might seem at first sight. Diekmann and Preisendoerfer (1992) point out that people with high levels of environmental awareness might not be willing to make bigger lifestyle sacrifices, but they seem to be more willing to accept political changes that will enhance pro-environmental behavior such as higher fuel taxes or more stringent building codes (Diekmann & Franzen, 1996; Lehmann, 1999).

Attitudes can indirectly influence our pro-environmental behavior. A study of college students' willingness to engage in pro-environmental behavior found

that those who believe technology and growth will solve environmental problems were less likely to make personal sacrifices. These findings indicate that people with a strong belief in growth and technological solutions might not see the need and will be less willing to engage in pro-environmental behavior with the implicit lifestyle changes (Gigliotti, 1992, 1994). Other studies have confirmed these findings (Grob, 1991). Many barriers are responsible for the gap between environmental attitudes and pro-environmental behavior. Nevertheless, values and attitudes clearly play an important role in determining pro-environmental behavior.

Environmental awareness. In this article, we define environmental awareness as 'knowing of the impact of human behavior on the environment'. Environmental awareness has both a cognitive, knowledge-based component and an affective, perception-based component (discussed in the next section on 'emotional involvement'). Environmental awareness is constrained by several cognitive and emotional limitations. Cognitive limitations of environmental awareness include:

(1) *Non-immediacy of many ecological problems.* Most environmental degradation is not immediately tangible (Preuss, 1991). We cannot perceive nuclear radiation, the ozone hole, or the accumulation of greenhouse gases in the atmosphere. Even changes that would theoretically be noticeable, for example the loss of species, often go unnoticed by the layperson. We can only experience the effects of pollution and destruction (e.g. smelling the rotten odor of a water body that suffers from eutrophication caused by agricultural run-off). This implies a time lag: very often, we only perceive changes once the human impact has already caused severe damage. Also, more subtle changes and changes in remote areas escape our awareness.

Because most environmental degradation is not immediately tangible, the information about environmental damage has to be translated into understandable, perceivable information (language, pictures, graphs). Most of the time this information will further our intellectual understanding without making a link to our emotional involvement (Preuss, 1991). It is the rare exception that a vivid, provocative image can be found to explain a scientific concept that at the same time engages people emotionally (a good example of this is the 'ozone hole'). The reliance on secondary information about environmental destruction removes us emotionally from the issue and often leads to non-involvement (Preuss, 1991; Fliegenschnee & Schelakovsky, 1998). The need for emotional involvement also explains why campaigns to protect big mammals—aptly named 'charismatic mega-fauna'—enjoy much broader public support than more abstract issues such as climate change. They are much more immediate and 'real' than climate change, which is only really knowable through mathematical models.

(2) *Slow and gradual ecological destruction.* Another cognitive barrier is the often very gradual, slow pace of environmental change (Preuss, 1991). Human beings are very good at perceiving drastic and sudden changes but are often unable to perceive slow, incremental changes. We are, in many respects like the frogs in the famous experiment: when placed into hot water, they immediately jumped out but when put into cool water that was slowly heated, they did not react and boiled to death.

- (3) *Complex systems.* Most environmental problems are intricate and immensely complex. Yet we are often unable to comprehend such complex systems and tend to simplify them and think linearly (Preuss, 1991; Fliegenschnee & Schelakovsky, 1998). This prevents us from a deeper understanding of the consequences of natural destruction. It might also lead to underestimating the extent of the problem. Overall, our cognitive limitations to understanding environmental degradation seriously compromises our emotional engagement and our willingness to act.

Emotional involvement. We define emotional involvement as the extent to which we have an affective relationship to the natural world. Chawla's (1998, 1999) work shows that such an emotional connection seems to be very important in shaping our beliefs, values, and attitudes towards the environment. Furthermore, we see emotional involvement as the ability to have an emotional reaction when confronted with environmental degradation. In other words, it is one's emotional investment in the problem. Research has shown that women tend to react more emotionally to environmental problems (Grob, 1991; Lehmann, 1999). Grob (1991) hypothesizes (and we agree with him) that the stronger a person's emotional reaction, the more likely that person will engage in pro-environmental behavior.

What makes us care? Why is it that some people care and others do not? The answers are extremely diverse, complex, and poorly understood. We all have areas that we are more passionate about than others. The question of why we are emotionally involved in one thing but not another is a very profound one. The following paragraphs cannot do justice to the enormous breadth and depth of the work that has been done in the fields of ethics, psychology, and sociology in an attempt to explore such questions.

(1) *Emotional non-investment*

- (a) *lack of knowledge and awareness.* As we argued in the previous section, because of the non-immediacy of ecological destruction, emotional involvement requires a certain degree of environmental knowledge and awareness. In many cases, emotional involvement is a learned ability to react emotionally to complex and sometimes very abstract environmental problems. Clearly, there are different degrees of abstraction: whereas most people understand and act emotionally to pictures of oil-covered seabirds, far fewer will feel saddened by the sight of a typical rhododendron-lawn-and-cedar-chip landscape surrounding the average New England home. Lack of knowledge about the causes and effects of ecological degradation can therefore lead to emotional non-involvement (Preuss, 1991; Fliegenschnee & Schelakovsky, 1998). Unfortunately, this does not mean that just providing this knowledge would be sufficient to create such emotional involvement.
- (b) *Resistance against non-conforming information.* Festinger (1957) states in his theory of dissonance that we unconsciously seek consistency in our beliefs and mental frameworks and selectively perceive information. Information that supports our existing values and mental frameworks is readily accepted whereas information that contradicts or undermines our beliefs is avoided or not perceived at all. Festinger's theory implies that we tend to avoid information about environmental problems because they contradict or

threaten some of our basic assumption of quality of life, economic prosperity, and material needs.

- (2) *Emotional reactions.* Even if we are experiencing an emotional reaction to environmental degradation, we might still not act pro-environmentally. Faced with the effects and long-term implications of environmental degradation we can feel fear, sadness/pain, anger, and guilt. The emotional reaction is stronger when we experience the degradation directly (Newhouse, 1991; Chawla, 1999). We hypothesize that fear, sadness, pain, and anger are more likely to trigger pro-environmental behaviors than guilt. A decisive factor for action is locus of control (see below). Strong feelings together with a sense of helplessness will not lead to action.

The primary emotional reactions we experience when exposed to environmental degradation are distressing. They will lead to secondary psychological responses aimed at relieving us from these negative feelings. Very often those secondary responses prevent us from pro-environmental behavior. Psychologists distinguish between different defense mechanisms. These include denial, rational distancing, apathy, and delegation.

Denial is the refusal to accept reality. The person lives believing in a 'bright dream' (Mindell, 1988) and filters incoming information to fit his or her version of reality (e.g. climate sceptics have to ignore or reinterpret most of the research that comes out of the Intergovernmental Panel on climate change (IPCC), a panel of over 2500 reputable climate scientists). Denial will prevent a person from pro-environmental behavior because the person refuses to acknowledge the problem.

Rational distancing is another way of protecting oneself from painful emotions. The person who rationalizes is perfectly aware of the problems but has stopped to feel any emotions about it. This defense mechanism is especially common among scientists and environmentalists who are frequently exposed to 'bad news' [7]. We would hypothesize that people who have emotionally distanced themselves are less likely to engage in pro-environmental behavior, because their internal motivation to do so is much weaker.

Apathy and resignation are often the result of a person feeling pain, sadness, anger, and helplessness at the same time. If the person has a strong feeling that he or she cannot change the situation (see locus of control), he or she will very likely retreat into apathy, resignation, and sarcasm. A person might stop informing himself or herself about environmental issues and focus on different aspects of life. Such a person might still perform some pro-environmental actions out of a feeling of moral obligation but is very unlikely to become very proactive.

Delegation is a means to remove feelings of guilt. The person who delegates refuses to accept any personal responsibility and blames others for environmental destruction (e.g. the industries, the multi-nationals, the political establishment [8]). People who delegate are unlikely to take any pro-environmental behavior that asks for personal sacrifices.

Locus of control. As defined earlier, locus of control represents an individual's perception of whether he or she has the ability to bring about change through his or her own behavior (Newhouse, 1991). People with a strong internal locus of control believe that their actions can bring about change. People with an

external locus of control, on the other hand, feel that their actions are insignificant, and feel that change can only be brought about by powerful others (see paragraph on delegation). Such people are much less likely to act ecologically, since they feel that 'it does not make a difference anyway'.

Responsibility and priorities. Our feelings of responsibility are shaped by our values and attitudes and are influenced by our locus of control. We prioritize our responsibilities. Most important to people is their own well-being and the well-being of their family (see Stern *et al.*'s (1993) model). When pro-environmental behaviors are in alignment with these personal priorities, the motivation to do them increases (e.g. buying organic food). If they contradict the priorities, the actions will less likely be taken (e.g. living in a smaller house, even though one could afford to live in a big one).

Conclusions

Many conflicting and competing factors shape our daily decisions and actions. Similarly, there are several factors that influence our decisions towards pro-environmental behavior that we have not elaborated on. We have omitted a discussion on our desires for comfort and convenience, two factors that certainly play an important role in shaping our pro-environmental behaviors. We have not discussed the influence of habits. If we want to establish a new behavior, we have to practice it (e.g. Fliegenschnee & Schelakovsky, 1998). We might be perfectly willing to change our behavior but still not do so, because we do not persist enough in practicing the new behavior until it has become a habit. Last but not least, we did not discuss the influence of personality traits and character on pro-environmental behavior.

Although we have already pointed out that developing a model that incorporates all the factors behind pro-environmental behavior might neither be feasible nor useful, we do find diagrams that serve as visual aides in clarifying and categorizing such factors helpful. We therefore conclude with our own graphic illustration of a possible model. As with the other models we have introduced, it has its advantages and shortcomings. We do not claim that this model is more sophisticated or inclusive than any of the other models. However, in designing it, we were influenced by many different authors, mostly Fliegenschnee and Schelakovsky (1998) who in turn based their diagram on the earlier discussed model of Fietkau and Kessel (1981).

As with Fietkau and Kessel (1981), we do not attribute a direct relationship to environmental knowledge and pro-environmental behavior. We see environmental knowledge, values, and attitudes, together with emotional involvement as making up a complex we call '*pro-environmental consciousness*'. This complex in turn is embedded in broader personal values and shaped by personality traits and other internal as well as external factors. We put social and cultural factors into the group of external factors even though it might be argued that social and cultural factors could be seen as a separate category which overlaps with internal and external factors. We also pondered if our model would differ at different stages in people's lives, and we agreed that it would not, but that the different factors inherent in it, and the synergies between them, would play greater or lesser roles during the development process. In addition, as we

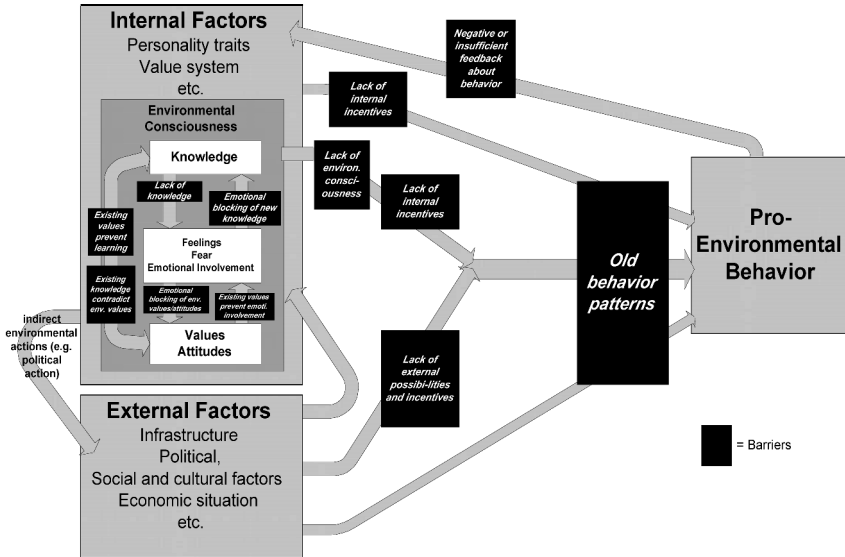


FIG. 7. Model of pro-environmental behaviour (Kollmuss & Agyeman).

pointed out earlier, the longer the education, the more extensive is the knowledge about environmental issues. Yet more education does not necessarily mean increased pro-environmental behavior.

The arrows in Figure 7 indicate how the different factors influence each other and, ultimately, pro-environmental behavior. Most are self-explanatory. The two narrower arrows from internal and external factors directly to pro-environmental behavior indicate environmental actions that are taken for other than environmental reasons (e.g. consuming less because of a value system that promotes simplicity or because of external factors such as monetary constraints). The biggest positive influence on pro-environmental behavior, indicated by the larger arrow, is achieved when internal and external factors act synergistically.

The black boxes indicate possible barriers to positive influence on pro-environmental behavior. The model lists only a few of the most important barriers. In the diagram, the largest of them represents old behavior patterns. This is partly for graphical reasons—the barrier has to block all three arrows—but it is also because we want to draw attention to this aspect. We believe that old habits form a very strong barrier that is often overlooked in the literature on pro-environmental behavior.

Notes on Contributors

ANJA KOLLMUSS received her BA from Harvard Extension and her MA in Environmental Policy from Tufts University. She currently works as the outreach coordinator for the Tufts Climate Initiative, educating students, faculty, and staff about global warming and climate change mitigation strategies. *Correspondence:* Department of Urban and Environmental Policy, 97 Talbot Avenue, Tufts University, Medford, MA 02155, USA. Email: anja.kollmuss@tufts.edu

JULIAN AGYEMAN is Assistant Professor of Environmental Policy and Planning at Tufts University, Boston-Medford. His interests are in social marketing for sustainability, education for sustainability, community involvement in local environmental and sustainability policy, environmental justice and the development of sustainable communities. He is founder, and co-editor of the international journal *Local Environment* and his book, *Just Sustainabilities: development in an unequal world*, is due out later this year.

Notes

- [1] Since we will analyze work in English and German publications, it is important to point out the subtle differences in meaning of the English *environment* and its German translation, *Umwelt*. *Environment* is defined as: 'The totality of circumstances surrounding an organism or a group of organisms' (*American Heritage Dictionary*, 1992, Boston, MA, Houghton-Mifflin). It is a very broad concept that does not have an *explicit* connection to the protection of the natural world. *Umwelt*, on the other hand, is almost exclusively used to describe natural environments and their destruction. It is a more narrow term that has a much stronger emotional component than *environment*, which is more abstract and scientific. *Umweltbewusstsein* (*environmental awareness*) has therefore a more emotional and ethical component to it in German than it has in English, whereas the term *environmental awareness* emphasizes the cognitive awareness of environmental problems. *Umweltbewusstsein* might more accurately be translated as 'environmental caring'.
- [2] Indirect environmental actions include donating money, political activities, educational outreach, environmental writing, etc. These activities, although extremely important, do not have a direct impact on the environment. Direct environmental actions include recycling, driving less, buying organic food, etc. These actions have a direct (admittedly sometimes very small) impact on the environment. We focus our study mostly on direct pro-environmental behavior.
- [3] Many of the tools and techniques that are used in community-based social marketing, such as norms, commitment, modeling, and social diffusion, all have at their core the interactions of individuals in a community. Norms develop as people interact and develop guidelines for their behavior (McKenzie-Mohr & Smith, 1999, p. 97).
- [4] We have made the assumption, that where an author uses 'ecologically', it is synonymous with 'environmentally'.
- [5] Pay per bag is a system in which garbage will only be collected if it is placed in pre-purchased bags. The theory is that if people have to purchase bags, they will cut down on their wastes, and recycle more.
- [6] Interestingly, in their study they found that driving correlates negatively with environmental attitude. This means that people drive more the more they care about the environment. This seemingly contradictory result can be explained when influences on environmental attitudes are explored. The more educated and affluent the people in the study were the more likely that they had a deeper environmental knowledge and a heightened sense of environmental awareness. At the same time, more affluent people tended to be more mobile, in other words, travel more.
- [7] Rational distancing is not always negative. It can be extremely important for people working in disaster areas. It allows the person not to be overwhelmed by the misery but react and plan cool-headedly.
- [8] We do note want to imply that everybody has the same influence or impact on environmental destruction. Some people have undoubtedly more influence, power, and ability to change things than others (see Blake, 1999).

REFERENCES

- ACKERMANN, F. (1997) *Why Do We Recycle? Markets, Values, and Public Policy* (Washington, DC, Island Press).

- AGYEMAN, J. & ANGUS, B. (forthcoming) Community-based social marketing for sustainability: tools and approaches for changing personal transportation behaviour.
- AJZEN, I. & FISHBEIN, M. (1980) *Understanding Attitudes and Predicting Social Behavior* (Englewood Cliffs, NJ, Prentice Hall).
- ALLEN, J.B. & FERRAND, J. (1999) Environmental locus of control, sympathy, and pro-environmental behavior: a test of Geller's actively caring hypothesis, *Environment and Behavior*, 31(3), pp. 338–353.
- BLAKE, J. (1999) Overcoming the 'value-action gap' in environmental policy: tensions between national policy and local experience, *Local Environment*, 4(3), pp. 257–278.
- BLOOMFIELD, D., COLLINS, K., FRY, C. & MUNTUN, R. (1998) *Deliberative and Inclusionary Processes: their contribution to environmental governance* (London, Environment and Society Research Unit, Department of Geography, University College).
- BOEHMER-CHRISTIANSEN, S. & SKEA, J. (1991) *Acid Politics: environmental and energy policies in Britain and Germany* (New York, Belhaven Press).
- BORDEN, D. & FRANCIS, J.L. (1978) Who cares about ecology? Personality and sex difference in environmental concern, *Journal of Personality*, 46, pp. 190–203.
- BURGESS, J., HARRISON, C. & FILIUS, P. (1998) Environmental communication and the cultural politics of environmental citizenship, *Environment and Planning A*, 30, pp. 1445–1460.
- CHAWLA, L. (1998) Significant life experiences revisited: a review of research on sources of pro-environmental sensitivity, *The Journal of Environmental Education*, 29(3), pp. 11–21.
- CHAWLA, L. (1999) Life paths into effective environmental action, *The Journal of Environmental Education*, 31(1), pp. 15–26.
- DIEKMANN, A. & FRANZEN, A. (1996) Einsicht in ökologische Zusammenhänge und Umweltverhalten, in: R. KAUFMANN-HAYOZ & A. DI GIULIO (Eds) *Umweltproblem Mensch: Humanwissenschaftliche Zusammenhänge zu umweltverantwortlichem Handeln* (Bern, Verlag Paul Haupt).
- DIEKMANN, A. & FRANZEN, A. (1999) The wealth of nations, *Environment and Behavior*, 31(4), pp. 540–549.
- DIEKMANN, A. & PREISENDOERFER, P. (1992) Persönliches Umweltverhalten: Die Diskrepanz zwischen Anspruch und Wirklichkeit *Koelner Zeitschrift fuer Soziologie und Sozialpsychologie*, 44, pp. 226–251.
- EISENBERG, N. & MILLER, P. (1987) The relation of empathy to prosocial and related behaviors, *Psychological Bulletin*, 101, pp. 91–119.
- FESTINGER, L. (1957) *Theory of Cognitive Dissonance* (Stanford, CA, Stanford University Press).
- FIETKAU, H.-J. & KESSEL, H. (1981) *Umweltlernen: Veraenderungsmoeglichkeiten des Umweltbewusstseins. Modell-Erfahrungen* (Koenigstein, Hain).
- FISHBEIN, M. & AJZEN, I. (1975) *Belief, Attitude, Intention, and Behavior: an introduction to theory and research* (Reading, MA, Addison-Wesley).
- FLIEGENSCHNEE, M. & SCHELAKOVSKY, M. (1998) *Umweltpsychologie und Umweltbildung: eine Einführung aus humanökologischer Sicht* (Wien, Facultas Universitäts Verlag).
- FUHRER, U., KAISER, F.G., SEILER, J. & MAGGI, M. (1995) From social representations to environmental concern: the influence of face to face versus mediated communication, in: U. FUHRER (Ed.) *Oekologisches Handeln als sozialer Prozess* (Basel, Birkhaeuser).
- GIGLIOTTI, L.M. (1992) Environmental attitudes: 20 years of change?, *The Journal of Environmental Education*, 24(1), pp. 15–26.
- GIGLIOTTI, L.M. (1994) Environmental issues: Cornell students' willingness to take action, *The Journal of Environmental Education*, 25(1), pp. 34–42.
- GROB, A. (1991) *Meinung, Verhalten, Umwelt* (Bern, Peter Lang Verlag).
- HINES, J.M., HUNGERFORD, H.R. & TOMERA, A.N. (1986–87). Analysis and synthesis of research on responsible pro-environmental behavior: a meta-analysis, *The Journal of Environmental Education*, 18(2), pp. 1–8.
- HUNGERFORD, H.R. & VOLK, T.L. (1990) Changing learner behavior through environmental education, *The Journal of Environmental Education*, 21(3), pp. 8–21.
- KAISER, F.G., WOELFING, S. & FUHRER, U. (1999) Environmental attitude and ecological behavior, *Journal of Environmental Psychology*, 19, pp. 1–19.
- KEMPTON, W., BOSTER, J.S. & HARTLEY, J.A. (1995) *Environmental Values in American Culture* (Cambridge, MA, MIT Press).
- LEHMANN, J. (1999) *Befunde empirischer Forschung zu Umweltbildung und Umweltbewusstsein* (Opladen, Leske und Budrich).

- MCKENZIE-MOHR, D. & SMITH, W. (1999) *Fostering Sustainable Behavior: an introduction to community-based social marketing* (Gabriola Island, Canada, New Society Publishers).
- MCLAREN, D., BULLOCK, S. & YOUSUF, N. (1998) *Tomorrow's World. Britain's Share in a Sustainable Future* (London, Earthscan).
- MINDELL, A. (1988) *City Shadow's: psychological interventions in psychiatry* (London, Routledge).
- MOISANDER, J. (1998) *Motivation for Ecologically Oriented Consumer Behavior*, Workshop Proceedings, March. The European Science Foundation (ESF) TERM (Tackling Environmental Resource Management Phase II 1998–2000). <http://www.lancs.ac.uk/users/scistud/esf/lind2.htm>
- NEWHOUSE, N. (1991) Implications of attitude and behavior research for environmental conservation, *The Journal of Environmental Education*, 22(1), pp. 26–32.
- O'RIORDAN, T. & BURGESS, J. (Eds) (1999) *Deliberative and Inclusionary Processes: a report of two seminars* (Norwich, CSERGE, School of Environmental Sciences).
- OWENS, S. (2000) Engaging the public: information and deliberation in environmental policy, *Environment and Planning A*, 32, pp. 1141–1148.
- PREUSS, S. (1991) *Umweltkatastrophe Mensch. Ueber unsere Grenzen und Moeglichkeiten, oekologisch bewusst zu handeln* (Heidelberg, Roland Asanger Verlag).
- RAJECKI, D.W. (1982) *Attitudes: themes and advances* (Sunderland, MA, Sinauer).
- REDCLIFT, M. & BENTON, T. (1994) Introduction, in: M. REDCLIFT & T. BENTON (Eds) *Social Theory and the Global Environment* (London, Routledge).
- REGIS, D. (1990) Self-concept and conformity in theories of health education, Doctoral dissertation, School of Education, University of Exeter. <http://helios.ex.ac.uk/~dregis/PhD/Contents.html>
- SIA, A.P., HUNGERFORD, H.R. & TOMERA, A.N. (1985–86) Selected predictors of responsible environmental behavior: an analysis, *The Journal of Environmental Education*, 17(2), pp. 31–40.
- SCHWARTZ, S.H. (1977) Normative influences on altruism, in: L. BERKOWITZ (Ed.) *Advances in Experimental Social Psychology*, Vol. 10 (New York, Academic Press).
- STERN, P.S., DIETZ, T. & KARLOF, L. (1993) Values orientation, gender, and environmental concern, *Environment and Behavior*, 25(3), pp. 322–348.
- VON WEIZAECKER, E.U. & JESINGHAUS, J. (1992) *Ecological Tax Reform* (New Jersey, Zed Books).
- WACKERNAGEL, M. & REES, W. (1997) *Unser oelogischer Fussabdruck: Wie der Mensch Einfluss auf die Umwelt nimmt [Our Ecological Footprint]* (Basel, Switzerland, Birkhaeuser Verlag).
- WILKIE, W.L. (1990) *Consumer Behavior*, 2nd edn (New York, John Wiley & Sons).