

No. 22

**Human well-being, natural landscapes and  
wildlife in urban areas. A review**

C L E Rohde and A D Kendle

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wildlife in urban areas. A review**

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# HUMAN WELL-BEING, NATURAL LANDSCAPES AND WILDLIFE IN URBAN AREAS

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## 1. INTRODUCTION

Much conservation work is directed by objective scientific criteria such as the maintenance of biodiversity. However the majority of popular activity in the UK is fuelled by an appreciation that people value wildlife and in some way benefit from its presence or continued existence. Habitats may be evaluated partly on the basis of their 'intrinsic appeal', recognising that scientific objectivity alone is not sufficient grounds for the selection of sites to protect (Ratcliffe, 1979). Nature conservation is after all a human response to problems that are caused by humans.

It is clearly essential that the human basis and purpose underlying conservation is well understood and its implications integrated into decision making. Nowhere is this more true than in urban areas where only rarely are species or communities of national or even regional importance present, but where the presence of those few, relatively common, species that are found can have an exaggerated importance and impact on people.

Arguing the case for a respect for urban nature conservation or, even more difficult, looking for positive funding to support it, requires that as much evidence as possible is made available to show where and how people benefit. A full review of the possible benefits (physical, economic and mental) of natural areas in towns, would be an enormous task. Fortunately conservation organisations are becoming increasingly experienced in collecting information that supports their cause.

As part of this general promotional activity there is a common, if intuitive, assumption that simple contact with nature is beneficial to human beings (c.f. Thomas, 1983, p. 267); it follows that 'nature' may be most needed where people are present in greatest numbers. However, the validity and significance of this assumption is not often examined in detail.

It is a problem for most people with a natural history background to know how to assess the emotional or psychological importance of wildlife. We know that we feel life would be cheapened, perhaps even made unbearable, if there were no natural areas to escape to, but how many other people feel the same?, is it possible to quantify the benefits?, above all how can we get people to recognise the importance more clearly and to develop a stronger sense of support or involvement in their environment?

This review attempts to clarify the issues involved. It tries to indicate where current understanding supports the case that nature benefits human 'well being', and also where it doesn't. It is also intended to highlight gaps in understanding and the need and possibilities for research.

The report is based on a wide ranging review of available literature; it indicates existing independent psychological research of value, it tries to show where claims are being made that are unfounded and can be undermined and also, just as useful in some ways, to illustrate to the non-psychologist or sociologist the degree to which such abstract concepts can never be 'proven'.

There are very few direct studies on the psychological benefits of urban wildlife in the literature. However, where appropriate, parallel research papers with a different emphasis have been considered if they provide pointers to important mechanisms or phenomena. Hopefully one benefit of this review will be to highlight the need for researchers to consider urban nature more directly when undertaking studies related to environmental psychology.

## **1.1 WHAT DO PEOPLE VALUE ABOUT URBAN NATURE?**

It is obvious from any casual observation that many human beings do not like to be dissociated from the natural world; as a nation we spend millions of pounds every year on garden and household plants for example. A belief in the healthiness and moral improvements possible through contact with nature have often been expressed through history, albeit not always focused on the 'wild' aspect.

As part of this review it has been necessary to develop a working classification that allows us to distinguish between categories of urban vegetation. The intention was to consider mainly the importance of 'urban wildlife' and 'natural areas in towns' rather than gardens or ornamental plants, although there is also a large body of literature that discusses the possible psychological benefits of gardens which is clearly of parallel importance.

Of course even highly bred garden plants are a part of nature but most naturalists will appreciate that we can distinguish between 'natural' and 'un-natural' nature. Usually this distinction is implicit in most of the urban conservation literature but of course

in some cases, e.g. where there is a reference to single mature trees, the distinction becomes meaningless.

In identifying the need for this working classification it is also interesting to speculate about the unique qualities that urban wildlife may have that differs from the possible benefits that may arise from nature in more ornamental or formal settings.

In many rural conservation settings the key criteria used to identify vegetation as 'semi-natural' are usually based on a combination of spontaneous regeneration and 'nativeness'. Much of the disapproval that is given to exotic plants has grown out of the work of Southwood (1961) concerning the relationship between invertebrates and host plants - possibly the most over-quoted piece of ecological research in the whole conservation literature. This relationship can have broad validity in semi-natural situations but it is unlikely that much of the wildlife in urban areas will have such strict food or structural requirements that they are dependent on natives. The vast majority of garden birds, for example, are known to live quite happily in exotic trees and shrubs.

In fact under detailed analysis most of the criteria that support this distinction between native and exotic, such as 'naturalness', appropriateness of landscape character or the number of associated insects, lose much of their meaning in an urban setting. There the environments are often entirely artificial, they may be dominated by completely unnatural ecosystem dynamics, they may have very few of the biotic components present that comprise an equivalent rural community.

If we accept that much urban conservation is carried out in the name of human preference and values, then the situation becomes less clear cut. After all, no one can deny that exotic species such as Japanese cherries are widely loved, yet you would not have to look too hard to find local wildlife trusts or 'wild gardening' books advising home owners to replace these with native species at every opportunity.

The argument for the use of natives in urban areas is therefore partly one of preference and aesthetics and of the ability such vegetation may have to represent 'true nature' to the human eye. One of the desirable qualities of 'urban nature' is therefore that it must be composed of those species that we associate, broadly, with our vision of the species that belong in the countryside. To a large extent this vision

will also require that the plants are found in the right sort of patterns, communities and growth forms - formally clipped trees in a symmetrical pattern on a closely mown lawn will be unacceptable even if every species present is native. Of course the difficulty with this concept is that different people, particularly those with different cultural experiences, may have contrasting images of what 'natural' areas look like (Harrison and Burgess, 1992).

To a large extent however the greatest distinction between the 'natural' and the 'unnatural' hinges on the degree of perceived control and human influence that is associated with the landscape. An area will lose its 'naturalness' if it is too closely maintained, modified or controlled by people. This distinction between the controlled and the uncontrolled is, after all, embodied in the very term 'wildlife'.

A very great part of the pleasure that comes from urban wildlife comes from its subversiveness, vitality and unpredictability, from a feeling that it is surviving somewhere where it shouldn't. A badger in the heart of Bristol in some way embodies nature's ability to re-invade and re-assert itself in the most unpromising environments. In that way it embodies a sense of natural renewal more strongly than can be achieved by a formal landscape.

Of course for most people there is a continuum of response with some species being regarded as acceptable whilst others, that are equally if not more subversive, are unwelcome. It is a very rare urban naturalist who would welcome a rat into the garden with as much pleasure as a badger.

It also follows that familiarity is an issue of importance. No one who works in conservation can deny that many people have a fascination for the unusual. Everyday features of our lives can not usually also be subversive or exciting. One of the most striking aspects of people's contact with urban wildlife is the way that single events can make a huge impact. Many people, when prompted, will be able to tell of the day, perhaps many years before, when they came face to face with a fox in the garden or experienced some similar event. Often, during the re-telling, their eyes will light up with re-lived pleasure and they will be able to describe exactly the time of year, the weather etc. The intensity of these responses depends partly on their very infrequency and the fact that they can not be conjured up on demand.

To a large extent the different reactions of people to urban wildlife may also reflect their feelings towards the loss of control that its presence represents. People who value formal ornamental landscapes most strongly will often see wild areas as 'untidy', 'unmaintained' or in some other way degraded. For others the degradation is associated with too much human influence, when an area becomes 'manicured', 'overformal' or loses its 'naturalness'. The roots of these different responses may be traced very far back into history - they reflect a debate that has been a theme underlying much cultural development and may also reflect inherently different personality types.

## **1.2 URBANIZATION AND HUMAN WELL-BEING - ARE CITIES UNHEALTHY PLACES, AND IF SO WHY?**

One of the implicit assumptions that is often made is that nature in cities may promote health and well being because it acts as an antidote to 'urbaness', which is believed to be unhealthy. However is there any basis to this latter viewpoint?

### **Urban versus rural**

Cities have existed since antiquity but the process of urbanization, i.e. the increase over time of the proportion of a country's population which lives in urban areas is a relatively recent phenomenon. In England and Wales, for example, only 17% of the population lived in towns of over 20,000 inhabitants by the year 1801; by 1851 the figure had risen to 35%, and by 1901 it was 55% (Darby, 1972, p. 39). In 1970 almost 80% of all the people of England and Wales lived in urban conglomerations, which is fairly typical for developed countries.

All through history, city and nature have been viewed as opposites. Thus Varro (116-27 B.C.) characterized the city as a place of artifice which he contrasted with the naturalness of the country (Darling & Milton, 1966, p. 318). This dichotomy of conception can be traced through the centuries, cities being conceived as institutional abstractions from nature and fortresses of humanism (Harrison, 1992, p.38. p. 147). However, the value which was given to the two extremes changed over time and varied according to culture. Thus the ancient Greeks viewed cities as centres of culture and civilization and valued them highly while the predominant image of the city presented in the Bible is one of moral degradation and vice (Fischer, 1976, p. 15).

## **Determinist theory - the negative influence of the city**

Western attitudes towards the city over the past hundred years or so have tended to be mainly negative, following their Christian traditions. Life in the city has been seen as contrived, grotesque, lonely and disturbed (ibid., p. 20), and the belief that cities have detrimental psychological effects on their inhabitants is widespread.

This has been put forward in a scientific form by Wirth in his theory of urban anomie (Wirth, 1938), which alleges that the city alters people's psychological conditions, isolating and "disordering" them (ibid., pp.27-35, 66). Wirthian theory, rather like Freudian theory, appears to have had quite a marked influence on popular culture, which is also commonly reflected in statements about the benefits of nature on city dwellers. Therefore it would seem to merit closer examination.

Wirthian, or determinist, theory was developed in an attempt to account for some distressing urban phenomena such as deviance, social turmoil, intergroup conflict, and the splintering of the moral order in the community (Fischer, op. cit., p. 237). According to the theory population size, i.e. urbanization itself, is responsible for these in that it produces psychic "overload" and structural differentiation, which in turn weaken intimate social groups and isolate individuals who become psychologically vulnerable and morally uncertain. Eventually, social disorganization ensues (Wirth op. cit., p. 236).

Psychic "overload" is thought to be a result of the profusion of sensory stimuli which impinge upon city dwellers' nervous systems largely as a result of intensive human activity. It is suggested that this onslaught is stressful, and that they protect themselves from it by becoming intellectual, and emotionally distant from one another (ibid., p. 30).

Relief from the stresses of city life is often mentioned in connection with nature pursuits (c.f. Walker & Duffield, 1983, p.7). However it is difficult to find evidence to support the notion that life in the city *per se* is more stressful than life in the country. For example, stress-related health problems have not been found to be regularly associated with community size (Fischer, op. cit., p. 165). Urbanisation is of course a complex phenomenon and it is not always easy for researchers to identify the key variables that explain human response.

## Is population density a cause of urban stress?

A particular source of stress and over-stimulation is often said to be population density. However, research has shown that crowding, i.e. the experience of disturbance due to the presence of other people, is more related to expectations and tolerances than to actual numbers of people, except perhaps at extreme densities. Therefore rather than being related to density, 'crowding' should be seen as linked with psycho-cultural standards and resource scarcity (ibid., p. 163). This is born out by studies on nature experiences such as visits to "wildernesses", where it is the visitors' expectations and perceptions of other visitors and their behaviour which will determine whether they report crowding or not, rather than the actual number of fellow visitors encountered (Stankey, 1989. pp. 286-292).

Accordingly density alone does not seem to be a major factor in determining city dwellers' stress or sense of crowding (ibid., p. 236). This does not, of course, mean that such stress does not exist, nor that measures for alleviating it ought not to be taken, but merely that it is our preconceptions and personal attitudes, rather than urbanization *per se*, that is the cause of this type of stress. It is of interest in this context that a study which investigated the relationship between density in residential environments and use of neighbourhood open space found no close relationship between the two (Alterman & Amir, 1983).

The implications for use of natural areas in towns are complex. In some cases it may follow that, if the nature area is perceived as a fragment of rural countryside within the town, people will value these places most if they experience relatively low levels of human contact. Moderate people pressure may be perceived as 'crowding' at lower densities than would be the case in the surrounding urban fabric.

The lack of evidence for the harmful effects of human density does not mean, of course, that urbanites do not suffer from psychological strain, disturbance or disorder, but merely that these are due to other factors than community size e.g. professional, financial, familial, emotional stresses, etc., few of which can be directly resolved by contact with natural areas. Of course it is possible that these stresses may be more often linked with urban lifestyles, but they can easily arise in rural settings as well. Rural dwellers ought not to be excluded from consideration when the psychological



benefits of nature are discussed, especially they do not necessarily have better access to nature areas than city dwellers.

### **Are town dwellers more psychologically vulnerable?**

Wirthian theory also contends that city dwellers are not only more stressed, but also psychologically more vulnerable as a result of their residence in the city. There do not appear to be any studies which have examined directly the relationship between community size and psychological vulnerability. However, a variable which has been studied is that of happiness. Again, no regular or significant relationship has been found between happiness and community size (Fischer op. cit., p 174).

Happiness has been found to be strongly related to the so-called Affect Balance Score (Bradburn, 1963), which in turn has been found to be related to protection from psychological disturbance (Phillips, 1968). Since urbanites are apparently equally happy as their rural counterparts, it would seem justified to assume that they are equally protected against psychological disturbance, and thus no more psychologically vulnerable than are the latter. This assumption is supported by the fact that epidemiological research into mental illness has indicated that its prevalence is no higher in rural than in urban areas. Thus, while the symptoms of mental illness are high in urban populations (Srole et al 1962) similar proportions are found in rural areas (Leighton et al 1963). In some rural communities mental illness is more pronounced than in urban (Wagenfield, 1982).

This might not hold for inhabitants of the very large metropolises (population above 3,000,000) because, when possible mediating factors such as youth and wealth were controlled, a small negative association between urbanism and happiness did emerge, though this applied only to developed and not to developing countries (Fischer, op. cit., p. 175).

### **Social groupings and networks in the city**

While city dwellers appear, then, to be mentally as robust as rural dwellers, they do tend to hold more unconventional values and beliefs, and to display more unconventional behaviour (ibid, p.192). The positive correlates of this unconventional nature are the inventiveness and creativity which flourish in the city, while the

negative ones are intergroup conflict, crime and moral uncertainty (ibid., p. 198). Determinist theory explains the creativity in terms of the intellectualization to which city dwellers have to resort in order to cope with their overstimulation, and the conflict in terms of their emotional detachment and the resulting erosion of social cohesion.

However, there is also little evidence to suggest that urbanites are emotionally cold and isolated. They have as many and as intimate friends as have rural people (ibid., pp. 138 - 141). Social networks and family ties too persist in cities, though they may be altered in that they may not be as neighbourhood-bound as they are in rural areas (ibid., pp. 122, 147). In fact, if anything urbanites are members of more social networks, these being very often occupation- and interest-based (ibid., pp. 100-123). Furthermore they adhere to the moral norms of these groupings just as much as ruralites do to the norms of their social networks. Therefore it would seem to be difficult to explain unconventionality, intergroup conflict, and crime in terms of normlessness and alienation, as determinist theory does (ibid., pp. 236-237).

An alternative explanation has been offered by sub-cultural theory, which agrees with determinist theory in that it attributes a major impact to the variable of population size, but it conceptualizes the nature of this impact quite differently. The basic tenet of sub-cultural theory is that the large number of people who live in cities makes it possible for individuals to find like-minded others. This provides them with the support and setting which they need to pursue their interests and ideas (ibid., p. 198). This applies to constructive pursuits, such as nature conservation, as well as to destructive ones, such as vandalism and crime. The sub-cultural groups which form themselves in this manner are internally cohesive but intergroup conflicts can arise. Thus, rather than a result of anomie, these phenomena are reflections of group identification and loyalty.

### **The implications of complex social groupings**

Contact with nature is sometimes seen as a possible way to enhance moral goodness (c.f. Nicholson-Lord, 1987, p. 28). In this context it may be important to bear in mind that what looks like normless behaviour is more likely to be "other-norm" behaviour. For example a common problem for managers of urban open space is to distinguish between exuberant play and environmental interaction and vandalism and it is

important not to assume that people are acting from negative or deliberately destructive impulses.

Urbanites' somewhat greater distrustfulness, which is interpreted by determinist theory as an indication of their general alienation, is also related to their group identification by sub-cultural theory (Fischer op. cit., p. 173). Like ruralites, urbanites tend to live in small, intimate, private social worlds (ibid., p. 151) but they are much more exposed to "strangers", which makes them feel that "out there" are very different people (ibid., p. 173). Contact with other sub-cultures very often leads to a firmer embrace of one's own social world, although mutual influences may also occur (ibid., p 38).

Stresses may also arise from the unpredictability of behaviour shown by strangers. This can have an important influence on the perceived uncertainty and distrust of open areas where it is believed that conflict with other people could arise.

#### **Other disadvantages and advantages of urban life**

Although it may be generally true to say that "the urban state of mind seems none the worse for its urban experience" (Fischer, op. cit., p. 177), urban living may carry more specific disadvantages for certain groups of city dwellers, which nevertheless could be of considerable importance.

City dwellers are more fearful of crime than are rural dwellers. This is understandable because the rate of crime, though rising in the countryside, is still higher in cities. Fear of crime is often given as one of the reasons for moving out of the city into suburbia or rural areas, and thus is strong enough to motivate behaviour.

Another detractor from city living is the experience of noise, for which a small but substantial connection with urbanism has been established and about which many city dwellers complain (ibid., p. 51). Children living in the ground floor flats of city apartment buildings showed poorer auditory discrimination and subsequent reading achievement than did children living on the higher floors (Cohen, Glass & Singer, 1973). This is apparently due to the fact that, as an adaptation to the loud ground noise of the city streets they learn to screen out auditory cues. The potentially wider

implications of such an interference effect of noise on infant development have been pointed out by Little (1987, p. 225).

A person's well-being is likely not only to depend on her/his socio-psychological state but also on her/his physical health. There would appear to be a direct link between urbanization and physical health in that the latter can be affected markedly by air pollution, and air pollution has been found to be associated with urbanization (Georgii, 1970; Bernatzky, 1979). Air pollution affects principally the respiratory, circulatory and olfactory systems, although other functions can be affected as well (e.g. lead will degrade renal function, impair haemoglobin synthesis, and affect the central nervous system adversely). People who are particularly vulnerable to its impacts are very young children, whose respiratory and circulatory systems are still undergoing maturation, the elderly, whose respiratory and circulatory systems function poorly, and persons who have pre-existing diseases such as asthma, emphysema, and heart disease (Stern et al., 1984, pp.105, 111). The provision of greenspaces and vegetation in cities may also have a direct effect on modifying some of these physical problems e.g. through interception of dusts (c.f. Bernatzky 1979). However this is outside the scope of this review. Other aspects of urban life may influence physical health, for example it is probable that there will be a higher proportion of sedentary occupations or lifestyles in urban populations.

These disadvantages may be weighed against the advantages of life in the city, amongst which is the greater availability of facilities. This may benefit particularly the less mobile. In the case of the elderly, for example, it was found that the larger the community in which they resided the more frequently they were able to use shops and general facilities such as medical centres (Fischer op. cit., p 62). Paradoxically access to green space for recreation may also be easier for some urbanites than for country dwellers.

#### **Why is city living so widely criticised?**

Accepting that life in the city may involve circumscribed psychological hazards, it is nevertheless important to bear in mind that, generally speaking, there is little evidence to support the notion that city dwellers are more psychologically vulnerable or disturbed than persons who live in rural areas.

The perception of scientists and others may at times be distorted by the cultural values they hold. This is illustrated by the experience of Gans (1962), who developed the concept of "urban villages" for what he had previously considered to be merely "slums" (Moore, 1979, p. 55). Arguably the worst images of city life are therefore perceived by visiting ruralites.

Arguments for the provision of resources for the recreation of city dwellers therefore ought to avoid prejudice and unsupported rhetoric. If urbanites are not inherently psychologically 'unhealthy' perhaps the emphasis ought not to be so much on the "healing" aspects of contact with nature as on the contributions it can make to psychological growth and fulfilment. Of course it is still possible that stresses such as financial worries may conceivably be reduced in their impact if opportunities exist for relaxation or absorption in other issues. Urban nature thus may not be a solution to a uniquely urban problem, but may play the same roles that rural nature does for country dwellers and visitors.

## 2. THE RELATIONSHIP BETWEEN HUMAN BEINGS AND NATURE

If the size and 'urbanity' of community is of less importance than is often assumed in determining the need for contact with nature, of greater significance may be personal characteristics which may influence the need for and benefits of contact with nature. This section explores the little we know about such characteristics. There are in fact very few studies which have examined the influence of personal characteristics on the psychological effects of contact with nature. The only area in which personal attributes have been examined as independent variables with any frequency is that of landscape preferences (which is the best researched field in "nature psychology").

Some personal attributes may reflect fundamental aspects of personality, others may be temporary in that they reflect changing circumstances in life. For example, one suggestion that will be explored is whether being ill may create such "special need" for nature, similarly being elderly and in danger of losing one's identity may be another.

In order to explore the significance of these personal characteristics and their influence on the relationship between individuals and nature, it is first important to identify the different ways in which such relationships could be modelled or explained. The different approaches that can be taken will in themselves influence the methods of study used, the underlying assumptions and the findings.

### 2.1 POSSIBLE INFLUENCES ON THE RELATIONSHIP BETWEEN HUMAN BEINGS AND NATURE: THEORETICAL CONCEPTIONS OF THE RELATIONSHIP BETWEEN HUMAN BEINGS AND NATURE

It is self-evident that there exists a relationship between human beings and nature. To many people it is just as self evident that nature has a wholesome influence on people - many examples from the literature could be quoted, but one will suffice: "... it is now widely accepted that people's well-being is related to this contact with nature in their environment" (Robinson, 1992, p.29) However, for scientific exploration it would seem to be important to make explicit what the nature of this relationship may be.

The answer to this question will differ depending on the theoretical approach, which the researcher endorses. Four models are used:

the trait approach  
the interactional approach  
the organismic approach  
the transactional approach (Altman & Rogoff, 1987, p.7).

These differ in the emphasis which they give to the different types of causation which may be recognised or assumed in scientific explorations. Close parallels can also be drawn with Aristotle's fourfold classification in which material, efficient, final and formal causes are distinguished. Even implicit assumptions about the nature of the relationship can heavily influence the approach taken in research studies and the methodology used.

**The trait approach** conceives personal characteristics to be the primary factors of importance. Psychological functioning is assumed to be more or less independent of physical and social contexts (ibid., p.11). In the field of people-nature research this model is found in the writings of theorists on landscape perception who trace back people's apparently marked preference for what they call savannah-type landscapes (open areas with occasional trees and possibly water) to their biological survival instinct (e.g. Kaplan, 1987; Appleton 1975, 1990). A trait approach conceptualizes the relationship between nature and human beings as essentially one where nature plays a subordinate part, acting merely as a trigger for otherwise independent psychological occurrences.

**The interactional approach** assumes 'cause and effect' relations between variables based on a systematic association. This concept is central to contemporary natural science. Under this model psychological functioning is seen as a joint and interactive product of situation and personal factors (Altman & Rogoff, op. cit., p.16). Psychological processes and environmental settings are treated as independently defined and operating entities, with the former usually seen as varying in response to the latter (ibid., p.15). Theories which are developed using this framework can be quite complex but they usually involve linear models (ibid., p.15). The emphasis is on analysis, objectivity, testability, replicatability, generalizability, prediction, and universal principles and laws (ibid., p.18).

Much of the landscape perception research which examines the interaction between environmental, person, and group variables adopts the interactional approach. An

example would be the studies on wilderness experience of canoeists and motor boat users (Lucas, 1964; Hammitt, 1982), which found that acceptance of level of use varied according to the area where other people were encountered, and also differed between the two user groups. In this relationship nature and human beings are essentially independent equals, Equality in this context does not, of course, mean that one cannot subjugate the other, it refers simply to operational independence. Subjugation, or "mastery and possession of nature" was, in fact, the goal which Descartes, the "father" of positivist science who provided the conceptual framework for the interactional approach, wanted to enable humanity to achieve (Harrison, 1992, p.108).

**The organismic approach** emphasizes predetermined directions, goals or end states toward which phenomena gravitate. The concept is teleological, there being a purpose to the occurrences observed. Organismic approaches take as their unit of study integrated systems. A system is seen as "more than the sum of its parts", which means that parts cannot be studied in isolation or in simple relations with other parts. What has to be comprehended is the holistic and complex set of relationships between the elements (Altman & Rogoff, op. cit. p. 19). The latter are independently definable, as they are in the interactional approach. However, they are not considered to be solely separate entities but rather they are capable of forming reciprocal and dynamic patterns of relationships where causality can operate in multiple paths and directions.

Most organismic approaches assume that system functioning is governed by a limited set of rules. The goal of research and theory is to discover these underlying "organic" principles, and objectivity, replicability and testability are essential for this. Systems are often conceived of as striving to maintain or move towards ideal states (ibid., pp.20-21). There do not appear to be any examples of the organismic approach in the field of people-nature research. However the basic premise that much of value in the landscape cannot be measured in simplistic terms, or that dissecting complex relationships somehow devalues them, is widely accepted intuitively.

There is a model which is concerned with psychological well-being and transport (Stokols & Novaco, 1981), which may illustrate this organismic approach. Component factors in this "ecological analysis" are mode of travel, travel aims and obstructions. Psychological well-being is influenced by factors such as perceptions of the situation, stress, physiological arousal, cognitive and behavioural functioning, attitudes,



adaptations, and coping responses. These component factors are assumed to have reciprocal and multidirectional causal relationships with each other. Well-being is associated with the degree to which personal and interpersonal goals and activities are congruent with qualities of the physical environment, i.e. is considered to be a function of person-environment "fit" (ibid., p.23).

Within the organismic approach parts are conceived of as inter-dependent. Applied to the people-nature relationship, this model would be characterized by mutuality and reciprocity. An organismic conception would assume that there is not only interaction between nature and human beings, but interdependency. Moreover, it would presumably accept that ultimately the relationship between human beings and nature moves towards balance and harmony.

**In transactional models**, the fourth and last type, the focus is on the pattern, shape or organization of a phenomenon (Altman & Rogoff op. cit., p.15). Bates (1979) uses the example of a bubble to explain this concept. The spherical form of the bubble is both a cause and a response to its whole nature in that "roundness is the only possible solution to achieving maximal volume with minimal surface" (ibid., p.15). The subject of the analysis is the shape of the bubble itself, and not the quality of its constituent parts air, water and soap, or the intentions of someone blowing the bubble. A similar concept may be expressed by considering how it would be possible to separate a dancer and the dance.

This approach is adopted by transactional conceptualizations, which examine holistic entities which are not considered to be composed of separate elements but are seen as confluences of inseparable factors, which depend on each other for their very definition and meaning.

Transactional approaches focus on changing relationships among aspects of the whole (ibid., p.24). Such change may result in psychological outcomes which are variable, emergent, and novel, which is to say that they are not always wholly predictable from knowledge of the separate aspects of the system. In this respect the transactional approach differs fundamentally from the others, in which psychological outcomes are quite predictable. In the trait approach psychological outcomes are limited by the predetermined qualities of the person; in the interactional approach they are predictable from the interaction of elements with known qualities; and in the

organismic approach teleological principles guide or pull the system towards a predetermined ideal state, making change highly predictable (ibid., p.25).

Despite variability and novelty, general patterns may form across similar events thus allowing general principles to be developed within the transactional approach as well. The emphasis is on changing configurations of person, psychological processes and contexts, with change, or time, being an intrinsic property of the holistic unities examined (unlike in the interactional and organismic approaches, where time is treated as a separate dimension).

In people-nature research transactional concepts are found in studies which use a phenomenological approach. This focuses on the experiential or meaningful aspects of the person-environment reality as they unfold. An example would be the descriptions of landscapes by geographers with a humanistic orientation, where the landscape is seen as inextricably linked with the people who have worked and lived in it, and the people are defined through their landscape (e.g. Tuan, 1979). Another example is the study by Margadant-van Arken (1989) on children's relationships with animals. The author describes the "fusion of the horizons" of the child's and the animal's world, which emerges through the gradual establishment of understanding and trust. This dynamic process follows "a more or less structured pattern" (ibid., p.17), which can be observed for different children (e.g. girls, boys, those with learning difficulties), animals (e.g. mice, cockerels, dogs, goats, and earthworms), and across settings (e.g. schools, and kindergartens).

The relationship between nature and human beings would be conceptualized by a transactional approach as one of integration rather than interdependency. The natural world forms us and is also formed by us. Being inextricably linked in a continuous and dynamic flow of occurrences, the two are seen to be inseparable. Such a relationship allows for self-initiated and qualitative transformations, and thus does not necessarily move towards an ideal or balanced state, as it is thought to do in organismic approaches.

Thus the relationship between nature and human beings can be conceptualized in at least four different ways. It would seem to be important to remember that none of these conceptualizations is uniquely "correct" or "true". They are simply different

ways of grasping different facets of reality. As such they can complement each other, hopefully leading to a more complete understanding of this reality.

In the endeavour to gain such an understanding though, it is essential to be clear about the theoretical approach which is being pursued at any one time, because otherwise a scientific debate, and with it an accumulation of scientific knowledge becomes impossible. A good example of an evident lack of clarity about the theoretical assumptions used is Robinson's (1992) article on "Healing with nature". Here the author jumps between different theoretical conceptions of the people-nature relationship.

## **2.2 POSSIBLE INFLUENCES ON THE RELATIONSHIPS BETWEEN HUMAN BEINGS AND NATURE: HUMAN BEINGS' RELATIONSHIPS WITH NATURE**

Conceptual clarity about the overall kind of relationship which may exist between human beings and nature can provide a background for a more specific investigations. On a personal level many factors may influence the outcome or nature of that relationship including culture, gender, personality, age, mood and state of health.

### **2.2.1 Cultural influences on human beings' relationship with nature**

Culture both reflects and forms our opinions of the world around us. Human beings' experience of nature is variable; sometimes it is positive and sometimes negative. It has changed through history, it differs amongst groups of people, and it may vary for the same individual over time. These changing attitudes are apparent from any study of literature through history. Inevitably this topic area embodies too many themes to be explored here but a general overview will be of value. Further texts of value include Thomas (1984) and Harrison (1992).

#### **Is control over nature good or bad?**

Often our attitude to nature seems to hinge on the fundamental issue of our inability to 'know' or to 'control' wildness and whether this is perceived as a welcome or an undesirable thing; whether a humanised and hence controlled

environment is seen as having been made more pure and spiritual or made more profane.

A description of the changes in human beings' reaction to nature through history is given by Harrison (1992) in his book on forests and people's relations with them. Forests are used as a metaphor for nature in its untamed, "wild" or "natural" state. Harrison traces back the relationship to mythical times and suggests that "archaic religion" reflects a traumatized relation between humanity and nature (ibid., pp. 2-13).

Forests often obscure communication with the Divinity, who is identified with the sky, the cosmic infinity, or the "heaven". As such they are an abomination. Moreover, God uses nature to give signs to humans. Accordingly the natural world is meaningful and uncanny - no longer a mere habitat but a phenomenal setting for people's lives. There is a fundamental rift between nature and human beings in that humans strive for clarity, structure and coherence in time, while nature obscures and leads to oblivion.

However, this notion of an antagonistic relationship between humans and nature is not the only one which can be detected (Harrison, 1992). Different views can be identified where a fundamental, although still uncanny, kinship between the two is assumed. It is expressed, for example, in Ovid's stories of the metamorphoses of humans who turn into creatures of the forest. Here a basic affiliation between all things is hinted at, which links them together by virtue of their common genesis (ibid., p. 29). Later, in the Elizabethan period, comedies use forests as settings for confusions of identity, gender reversals etc., places where conventional reality no longer holds. Forests, in these times, are also refuges for outlaws such as Robin Hood, another reflection of the way that nature allowed people to transcend the "law of civilization" (ibid., pp. 63-80).

These two reactions to nature, where it is seen on the one hand as a monstrosity (or later, by the Christian Church, as the "anarchy of matter itself"; ibid., p. 61), and on the other as an existential extension and/or sanctuary, may at first appear to be very different. However, it could be

argued that they have something fundamental in common: in both cases nature is essentially seen as subversive.

This aspect appears to be submerged in later attitudes towards nature, but the basic split between negative or positive feelings remains. An example of the former is expressed by Dante in his "Divine Comedy", where in the Prologue Scene a non-specific, rather vague and indefinite fear of the forest prevails, which borders on existential anxiety (ibid., p. 82). This sentiment resurfaces in modern times in the writings of the existentialists. Confronted with the indifference and incomprehensibility of a tree, Sartre's protagonist Roquentin is terrified by the world of nature (ibid., p. 147), and his realization of the absurdity of his existence. Fear is a powerful emotion which is disruptive and can be inhibitory but it is not subversive. Similarly joy over nature and lyric nostalgia can be very strong feelings but they are never subversive.

Joy, or enchantment, over beautiful woodlands is experienced by Dante after the purgatory process, the forest having turned from a wilderness, i.e. unhumanized nature, into "a municipal park under the jurisdiction of the City of God" (ibid., pp 84-86). An attitude of lyric nostalgia towards nature is exhibited by Petrarch (ibid., p. 93), and later by Wordsworth, amongst others, whose imagery of the forest evokes deep feelings of proximity to nature which is seen as a spiritual resource (Thomas, 1984, p. 267).

Besides the positive and negative emotional reactions to nature reflected through history, a third attitude emerged with Descartes, who sought to enable humanity to achieve "mastery and possession of nature" through the application of mathematical method. Fundamental to this approach is an abstraction from nature, where forests become an object of a new science, which, in conjunction with the laws of economy, paves the way for their conception merely in terms of "utility" (ibid., pp. 107-108). It would appear that it was this attitude, where the claim of dominance over nature was combined with the concept of its utility, especially its economic utility, which has been responsible for the "ruthlessly manipulative approach" to nature first shown by Europeans (c.f. Thomas, op. cit., p. 23).

The three types of reactions which human beings have shown to nature through history continue to be in evidence today. The conception of nature as a utility, or at least discomfort with more abstract values, would seem to be particularly evident in "official circles", whether it is interpreted in financial, aesthetic, recreational or conservation terms. Emotional reactions, whether of a positive or negative kind, tend perhaps to be expressed more in the private domain, although they are by no means restricted to this.

The subversive potential of human beings' relation with nature, which had not been much evident over many centuries, also would seem to have resurfaced in recent times. With the increase in ecological awareness, concern over practices and policies perceived to be harmful to nature has grown. In some cases this has led to people opposing them either individually or in groups at the risk of contravening the law, which is considered to be insufficient for the protection of nature or even hostile to it.

Although recurrent themes are identifiable through history, weight is given to different attitudes at different times and in different societies. The changes shown in human beings' response to nature through history are reflections of wider cultural changes which occurred at the time.

### **Cultural and sub-cultural differences**

That culture has a marked influence on the relationship between people and nature would also seem to be indicated by the differences which exist between cultures and sub-cultures. Many differences may reflect perceptions of each society's relative control over the wider landscape (Thomas, 1984). For example the Dutch, who are often regarded as a nation with the highest degree of concern for urban wildness are also a nation which has almost completely dominated and suppressed their natural countryside. However more subtle aspects of national culture may also be important.

Various nations thus hold apparently quite distinct attitudes towards nature. It has been suggested, for example, that the French vision of nature is quite different from that of the Anglo-Saxons (Carlisle, 1992). The French value tameness but not "naturalness" (ibid., p. 40). They love nature but feel it

needs to be trained and shaped according to human objectives, just as children need to be trained to become civilized human beings. This attitude translates itself into a handling of the vegetation which results in neatness, orderliness, symmetry and regularity (ibid., p. 39). The approach is rationalist - in accordance with French cultural tradition - and completely anti-romantic in the literary sense (ibid., p. 40). Nature becomes a pleasing backdrop and template for human activity (ibid., p. 43), whose civilized character and dominance is thereby assured.

Another relationship with nature has apparently evolved in the Japanese culture (Saito, 1992). In Japanese tradition humankind and nature are viewed as parts of an integrated whole. This is often contrasted with Western attitudes of dominance and arrogance towards nature (ibid., p. 1). However, Japanese love and respect for nature has not resulted in its defence and protection. On the contrary, "Japan's abuse and destruction of nature strikes us" (ibid., p. 3). It is argued that the conceptual premises that frame the Japanese love of nature are responsible for this.

Firstly, nature is regarded as a friend and companion, which serves the individual as a refuge and restorative (ibid., p. 3). Thus it is not valued for its own sake but merely for the psychological benefits it can convey. While such an attitude may encourage sensitive communion with nature, an essential passivity is implied in the role of the refuge and restoration seeker (this is in accordance with the trait model discussed above). Secondly, human life and nature are equated in their impermanence, which leads to an attitude of quiet resignation and acceptance of the fragility and sorrow of existence (ibid., pp. 3, 5). This can enhance the appreciation of nature but will not encourage its active preservation. Thirdly, there is the Zen Buddhist worldview according to which humanity and nature are harmonious and unified in all manifestations of the immediate presence. All things have Buddha-nature, and a "responsive rapport" with them, which transcends common-sense perception and provides richness of experience. Theoretically this applies, for example, to a polluted river as much as to an unspoilt one. Thus the notions of Zen Buddhism, though they may lead to a highly aesthetic approach to nature, do not contain any stimulus for action to protect it either (ibid., pp. 6-8).

The examples of French and Japanese cultural influences on the relationship between human beings and nature suffice to exemplify national variations. In both cultures a love of nature is evident, but the form this love takes and its consequences differ profoundly.

Differences in human relations to nature may also occur between sub-cultures. Thus it has been reported, for example, that the attitudes which oriental Jews in Israel hold towards nature are distinct from those of Jews of western background (Stahl, 1993). Oriental children regard the forest apparently still with suspicion and fear (ibid., p. 14). This attitude, which is also found among other cultural groups such as traditionalists in Europe and the Islamic world, is consistent with the image presented in the Bible. There nature in its wildness is seen as threatening both because of the dangerous animals, which are part of it, and because of the temptation it presents to humans to contemplate its beauty rather than to devote themselves entirely to the service of God (ibid., pp. 6-7).

Other sub-cultures may differ with regard to aspects they appreciate in nature, but may share a common love of it. Thus, "striking differences" were found by Kaplan & Talbot (1988) "between blacks and whites in preferences for nature settings" (ibid., p. 111). Blacks favoured settings which were characterized by a generally well-kept appearance, and by more openness and greater visibility. Furthermore they seemed to like built elements such as benches, paved walks and picnic shelters (ibid., p. 113). These results appeared to be consistent with those of other studies, where it had been reported, for example, that blacks viewed man-made structures more favourably (Zube et al., 1975) and liked "more manicured settings" (Anderson, 1978), and were less involved in wildland recreation (Leatherberry, 1984). However, contact with nature was equally important to blacks and whites, who also did not differ with regard to the amount of contact they had with nature where they lived (Kaplan & Talbot, op. cit., p. 115). The authors underline the fact that their results do not indicate that blacks value contact with nature less than whites, but merely that they prefer different arrangements within a natural setting (ibid., p. 116).



Of course membership of different ethnic groups often also implies very different social experiences and one may wonder to what extent these differences in preferences were actually a result of inherent ethnic differences.

It has been found that city dwellers react more favourably to man-made structures than others (Zube et al, op.cit.), and, similarly, that density of housing influences the preference for degree of man-influenced landscapes (Dearden, 1984). Familiarity is thought to be responsible for this, people tending to prefer environments which they find non-threatening (Wohlwill, 1976).

Kaplan & Talbot's results are based on three studies (op. cit, pp. 110-115). In one of these, which included by far the largest number of black participants, the latter were residents of inner city neighbourhoods. In the other two studies the subjects, who included whites, were "demographically diverse" (ibid., p. 110). It is likely that this "diversity" includes black city residence, since segregation has occurred in American society, with whites living predominantly in suburbia and blacks in the more built-up areas. The preference blacks showed for openness, "kemptness", and built elements may then be due to their greater familiarity with such landscapes rather than more fundamental cultural differences.

The other studies, which found ethnic differences for landscape preferences, also have methodological shortcomings such as small sample size and absence of demographic data, as Kaplan & Talbot have pointed out (ibid.. p. 110). It would seem to be of interest therefore, that a study in which the variable of race was only indirectly assessed but in which residential location (urban vs rural) was controlled, found no consistent effect of a group's racial composition on its preference variation (Lyons, 1983, p. 504). In any case, the question as to whether black ethnic group membership influences attitudes towards nature as reflected in landscape preferences remains open to clarification and further investigation.

### **Social class differences**

The same appears to apply to social class membership. Various authors have assumed a link between "position in society and appreciation of nature and open space", as Foresta (1980) has pointed out, the assumption being that aesthetic enjoyment of and protectiveness towards wildlife is a prerogative of the wealthier and better-educated even though there is evidence that contradicts this (ibid., pp. 449-450). Thus a telephone public opinion survey into why New Jersey residents valued open space indicated that there are commonalities across classes (as, indeed, races), which far outweigh differences. The uses which were consistently valued most were nature-based (e.g. breathe fresh air, view natural scenery, enjoy a place unchanged by man), and this was true across residential, income, and educational group membership, and race.

The author argues (ibid., p. 452) that the high value given to contact with natural nature is consistent with findings which have indicated that there is a willingness throughout American society to forgo economic expansion for the preservation of natural lands (Chandler, 1972). However it is inevitable that these decisions must become more difficult when true economic hardship is faced.

Another consistent finding would seem to be that of Dearden (1984), who discovered that lower income subjects did not differ significantly in their landscape preferences from higher income subjects (ibid., p. 302). Thus, as in the case of ethnic group membership, it seems to be at least uncertain as to whether social class affects a person's attitude to nature. According to Forest, the insistence on social-class differences in nature appreciation is due to self-interest on the part of those who hold this view (ibid., pp. 453-455).

### **The influence of careers, training and special interests**

Preference must to some extent reflect the interpretation and meaning given to scenes and this interpretation is likely to change with education and professional training. However it may also reflect inherent differences in people attracted to different professions.

Occupational and interest group memberships are other sub-cultural variables which have been considered in connection with people's attitudes towards nature, or, more accurately, their preference for different kinds of natural settings. The findings with regard to the professions appear to indicate that some may differ in their appreciation of landscapes from "the general public", while others do not, although the respective studies are not strictly comparable because somewhat different methodologies were used.

In one study planners were not found to differ significantly from "members of the more general public" in their preferences for the three landscape types examined, which were urban fringe, rural, and wilderness scenes (Dearden, *op. cit.* pp. 297-298). However different findings were obtained from a study which included a group of foresters amongst its subjects (Balling & Falk, 1982). Preferences for five different biomes were assessed. These were tropical rain forest, desert, savannah, temperate deciduous forest, and coniferous forest. Foresters showed overall the highest preferences for all these natural environments of any of the adult subject groups. Moreover under the instructional condition under which they did distinguish between the five biomes (preference for living in the respective landscape types rather than visiting them), they preferred the temperate and coniferous forest landscapes rather than the savannah, as did the other subjects. Their highest rating was for the coniferous forest, although the respective differences were not statistically significant.

The foresters worked largely among loblolly pine stands, and it seems plausible to assume that their liking for the non-tropical forests, especially the coniferous forest, was at least partly a reflection of their greater familiarity with these kinds of natural settings. Familiarity is often an important determinant of preference, as was mentioned above.

However their generally higher preference ratings were thought to be related also to a self-selection factor, in that foresters are likely to be people who like natural environments (*ibid.*, p. 25). In comparison, planners are presumably more removed from the landscapes with which they deal.

Familiarity and self-selection would also seem to be factors which can account for differences in the landscape preferences of special interest and other groups. Thus members of an active environmental lobby group were found to have a significantly higher preference for wilderness than for rural or urban fringe landscapes, and they were the only ones who preferred wilderness to rural scenes (Dearden, *op. cit.* p. 298).

In another study (Kaplan & Herbert, 1987) members of the Wildflower Society of Western Australia showed different preferences for many Australian landscape scenes compared to Australian students, though these two groups were similar in terms of mean preference scores across all scenes, and differed in this respect from American students who had lower mean scores. Differences seemed to be related most consistently to the presence of native plants, with members of the wildflower society indicating a disfavour of pines, farmland and less pristine indigenous bush, which was not shared by their student compatriots (*ibid.*, p. 284).

Interest group membership was also found to affect landscape description (Craik, 1975). Members of environmental organisations or conservation or ecology groups had a distinct way of describing a local landscape to which they were exposed *in vivo*, which differed from groups which were characterized by other attributes than organizational affiliation (*ibid.*, pp. 148-149). All these findings would suggest that sub-cultural groupings which are nature-related, whether they are professional or "extra-curricula", have a marked effect on the perception and liking of nature in landscapes of their members, the mediating factors being apparently greater familiarity (presumably both with the actual natural phenomena and the theoretical issues surrounding them) an inherent interest and a greater knowledge or ability to interpret meaning from the settings viewed.

### **Gender influences on feelings towards nature**

A further sub-cultural variable which has been examined with regard to its influence on the people-nature relationship is gender. It would appear that, generally speaking, women tend to have stronger feelings and concerns towards nature, and are more likely to oppose the subordination and

domination of animals and the environment, while men possess better technical knowledge (Cohen & Horm-Wingerd, 1993, p. 107). Furthermore, in a study on the emotional effects of landscape viewing, it was found that female students maintain their level of "Positive Affect" (positive emotion arising from the stimulus) when viewing vegetation scenes but when exposed to urban built-up scenes they report a sharp decline, while in male students it decreased slightly irrespective of the type of landscape they looked at (Ulrich, 1981. p. 544).

Such differences between the sexes are evident already in childhood. For example, in an investigation of attitudes towards vegetation amongst 8 to 11-year olds (Harvey, 1989), girls were found to have consistently a more sympathetic relation with plants in that they like the contact with them as sources of food and ornamentation. Boys, on the other hand, see in vegetation a challenge and obstacle to be overcome, as well as a vehicle for adventure.

It is likely that such gender differences are related to the dissimilarities of the socialization process of the two sexes, which still prevail and which result in them having different experiences of the world around them. From an early age, girls are encouraged to be less exploratory, more fearful, and less physically active than boys (Franck & Paxson, 1989). Studies indicate that the spatial range of girls' activities beyond the home is smaller than that of boys, and that girls' play is less likely to involve active manipulation of the environment (ibid., p. 127). A relative restriction to the private space of the home would seem to be consistent with fostering an attitude of solicitous care and aesthetic pleasure towards plants, while exploration is likely to involve challenge and adventure and will lead to knowledge.

The notion that gender differences in environmental knowledge, if not in attitudes towards nature, are most probably a function of the socialization process is suggested by the study of very young children (Cohen & Horm-Wingerd, op. cit.). Ecological awareness amongst pre-school girls and boys was found to be similar, which led the investigators to conclude that "the formation of specific attitudes toward the environment .... occurs sometime after early childhood, perhaps, during the transition from early to middle childhood" (ibid., p. 117).

That differences in experience with nature lead to variations in attitudes and behaviour towards it, is supported by a comparison of urban and rural children's reactions. Urban children were found to be more in favour of using technology to modify and dominate the natural environment (Bunting & Cousins, 1985. p. 757), and to be more fearful than rural children, who possess greater ease in pastoral settings (Hart, 1979).

The different socialisation process of male and female children may also contribute to the differences which have been observed between the sexes in the use of urban green spaces. Women were found to use such areas less frequently than men, and when they do use them they primarily engage in passive activities such as walking and dog walking while men pursue more active behaviours such as playing football, cycling and jogging (Millward & Mostyn, 1989, p62). Furthermore that girls who used a woodland in the centre of a housing estate (comprising 20% of users compared to 50% who were boys) "invariably entered in groups and played along the edges or scurried along the paths arm in arm" (Tartaglia-Kershaw, 1982, p.22), while the boys used the whole wood.

Womens' lesser use of public open spaces is thought to be partly a result of their limited experience with such areas having been confined, when children, relatively close to home. As a consequence women do not feel as comfortable in public areas as men and appear to believe that they need a legitimation for being there. Men, in comparison, regard these areas as naturally part of their domain (Franck & Paxon, op. cit).

Of course one aspect of great concern for those responsible for natural areas in towns is the relationship between gender and fear of attack. One factor which is thought to contribute to their lesser use of public spaces is womens' greater fear of crime. In green spaces where wardens are present the difference in the rate of use between women and men is considerably smaller than in unguarded areas (Millward & Mostyn, op. cit.).

The concern that woman feel for their safety appears disproportionate to the actual likelihood of attack. Men are more frequently the victims of crime, although the likelihood of sexual attack is greater for women (Franck &

Paxon, op. cit p.128). Furthermore it was found that women were approached twice as frequently by strangers and that the most frequent type of interaction with them were sexual remarks and pick-up attempts (ibid p. 129). It is likely that these encounters foster womens' feelings that their "sexuality makes them fair game to men in public spaces" and that they "cannot claim as much right of privacy as men can" (ibid, p.130). Their reaction to these feelings is to avoid the areas involved, especially when the activities involved are discretionary, to go only when in company or to find some other form of protection/legitimation (such as dog walking).

Of course these are extremely difficult areas to research. The frequency of sexual attack or even just of approach by strangers may have little relation to the level of 'risk' perceived by women and this sense of vulnerability is often encouraged by media. The consequence of unrealistic risk assessment could be a self-imposed deprivation for those who would enjoy or benefit from greater contact with nature, whilst the absence of women from green spaces increases the isolation of those that do visit.

There may be other barriers which prevent women finding the time for contact with nature - their involvement in housekeeping and childcare tends to reduce the time available for discretionary activities. Women may be accompanied by small children which may preclude them from using areas where access is difficult (ibid p130).

### **2.2.2 Individual influences on human beings' relationship with nature**

Besides the possible cultural and sub-cultural influences on the relationship between human beings and nature, there may be other aspects which are linked directly with the individual, such as the effects of developmental, personality, and transient state variables.

#### **The influence of age on response to nature**

It is commonly reported that age appears to influence reactions to nature. For example interest and affection for wildlife and the outdoors was found to be more common among children of all ages than among adults (Kellert, 1984).

Furthermore, children were reported to have more intense preferences for nature settings than adults. In a study into the preferences for vegetation types represented by five biomes (tropical rain forest, temperate deciduous forest, northern coniferous forest, savannah, and desert) "young children as a group were more enthusiastic .... in assessing landscapes than were older subjects" (Lyons, 1983, p. 500). Subjects included in this study covered the whole age range from young children to the elderly, and it was found that an increase in age was accompanied by a general decrease in preference.

This finding replicated results of a study which investigated the same five biomes where it had been similarly found that overall preference decreased with age (Balling & Falk, *op. cit.*, p. 16). Furthermore, a heightened preference for the savannah biome was found for the two youngest age groups, which was interpreted as lending limited support to the hypothesis that humans have an innate preference for this landscape (espoused particularly by Appleton, 1975; and the Kaplans, e.g. 1987), which is then modified by experience. However, this finding was not replicated by the later study, where children were generally less consistent in their assessments of the landscapes than were the older subjects (Lyons, *op. cit.*, p. 500).

Therefore one characteristic that distinguishes children from older people is the intensity of their liking of natural environments. However it may not be that the intensity of their likes is limited to nature settings alone. It has been found that younger people report a generally stronger level of emotion (both positive and negative) than do older people (Braun, 1977), which would presumably include likes and dislikes. Therefore it would seem possible that the more intense likings younger subjects showed for the natural landscapes were at least in part a reflection of their generally more intense feelings, rather than of a specific fondness of nature settings.

Accepting that children's stronger landscape preferences may at least partly be due to their generally stronger emotion, it would nevertheless appear that female children, though not necessarily males, do have a specific, or differential, leaning toward nature. Thus it was found in a study investigating personality dispositions toward the environment in children (Bunting & Cousins, *op. cit.*) that, when all the children were taken together, their highest



score was on "Pastoralism", which reflects "a positive responsiveness to natural environments, outdoors and open spaces", while "Urbanism", measuring "a broad attraction to human-made environments", ranked second to last (ibid., pp. 741 -744). However, there was an interaction effect of age and sex which reflected a rapid decrease in the "Pastoralism" score for the males after the 6th grade while the females' score remained more or less unchanged (age groups included in the study were 9 to 16 year olds). The "Urbanism" score increased with age, regardless of sex (ibid., pp. 754 -755).

Thus it would appear that age does affect human beings' relationship with nature, and the effects may be different for the two sexes at the various stages in their lives. The latter finding is also suggested by information on leisure behaviour though the life cycle, where it has been found that contact with nature in the form of gardening and park visits increases with retirement age for men but not for women, who are more engaged in social pursuits (Parker, 1979, p. 33).

Whether, or to what extent, such changes in the behavioural involvement with aspects of nature through the life cycle are related to changes in the person's relationship with nature, rather than being reflection merely of other factors such as availability of time, remains an open question. Certainly the question therefore remains as to whether today's children will become more like today's older people as they age.

It is often reported that elderly people respond less favourably to wild areas in towns, perceiving them as untidy or unattractive. The factors that contribute to this difference must be complex. They may reflect a greater accumulated familiarity with traditional landscape styles but also differences in environmental education and prevalent awareness in society when growing up. Elderly people also often experience a higher level of fear or anxiety and may feel less comfortable in settings that they perceive as less controlled. Again this perceived vulnerability is not supported by objective risk assessment.

## Personality influences on response to nature

Individual differences in people's experience of nature may not only be related to their age but also to their personality. The concept of personality and its measurement has come under criticism by psychologists (e.g. Mischel, 1968), and the idea that stable traits determine human behaviour has been questioned. It has been argued, especially by "ecological psychologists", that behaviour is situation-specific, varying according to setting rather than personality traits (e.g. Barker, 1968). However, while it is now perhaps generally recognized that situational, or contextual, variables are of major importance in influencing human behaviour, it is also widely accepted that personality dispositions mediate environmental effects.

For example Little (1987 pp 225-26) suggests that "for individuals characterized by a high degree of aesthetic orientation and environmental concern, the physical milieu may be a major, perhaps the prepotent, source of meaning in life. For others, perhaps more person-oriented, dependent, and anxious individuals, the physical milieu may be a bland backdrop against which social figures stand stark and salient". The thinking in this field has moved from a trait to an interactional model (c.f. section 2.1.1., above), and some environmental psychologists are attempting to develop a systemic approach such as the "personal projects analysis" (Little, 1983).

Thus personality variables retain their importance for understanding human-environment transactions but there appear to be few studies which have addressed the issue of personality and human relations with nature. A discussion of how commonly used personality measures can be interpreted as measures of environmental dispositions, if not dispositions towards nature, is provided by Little (*op. cit.*, pp 215-219).

A measurement tool which includes scales which have a direct bearing on the people-nature relationship is the "Environmental Response Inventory" (ERI) by McKechnie (1974). This questionnaire, which consists of 184 items, comprises eight scales plus one validity scale: "Pastoralism", "Urbanism", "Environmental Adaptation", "Stimulus Seeking", "Environmental Trust",

"Antiquarianism", "Need for Privacy", Mechanical Orientation", and "Communality" which is the validity scale.

Bunting & Cousins (op. cit.), in their study with children referred to above based their measure on the ERI, although its items were modified since they had to be applicable to children. The scales which are nature-related are "Pastoralism" and, to a lesser extent, "Environmental Adaptation" and "Environmental Trust". "Pastoralism" is characterized by opposition to land development; support for the preservation of natural resources, including open space; self-sufficiency in the natural environment, sensitivity to pure environmental experience; acceptance of natural forces as shapers of human life; and concern about population growth. "Environmental Adaptation" includes use of technology to solve environmental problems; and modification of the environment to satisfy needs and desires, and to provide comfort and leisure; while "Environmental Trust" involves a general environmental openness, responsiveness, and trust; competence in finding one's way about the environment vs fear of potentially dangerous environments; and fear of being alone and unprotected (McKechnie, 1977, p 258).

The ERI has apparently very good psychometric properties (c.f. Bunting & Cousins, op. cit., p. 727), and thus would seem to be well suited to help explore personality aspects of the people-nature relationship. However, it does not appear to have been used very much for this purpose (Little, op. cit., p. 218). An investigation which did examine the relationships between the environmental dispositions measured by the ERI and recreational activities revealed a significant correlation between "Pastoralism" and backpacking (McKechnie, 1974). Correlations do not, of course, give any information about the direction of the relationship present, but it is probable that their proclivity towards nature makes backpackers pursue this leisure activity.

That outdoor recreation is strongly motivated by the opportunity it furnishes for contact with nature is suggested by other research in this area, which indicates that the most salient motive for participation in activities which take place in natural settings, such as National Park visits, rock climbing, and even big game hunting, is the chance of getting close to nature and experiencing wild environments (Prigam, 1993, pp 403-404, 410-412). It would be

interesting to see whether big game hunters also score high on "Pastoralism". If they did, they would probably differ from backpackers in their other scores on the ERI, especially those on "Environmental Adaptation" and "Environmental Trust".

Another study in which the ERI was used is that in which graduate optometrists, who had chosen to practice in rural or urban areas, were compared on a number of psychological tests (Kegel-Flom, 1976). It was found that the two groups differed in their "Urbanism" (but not in their "Pastoralism" or any other ERI scores) with practitioners of urban areas scoring significantly higher. This would suggest that the "migration" pattern of these professionals was influenced by a liking and desire for city life rather than by an inclination towards life in the country with its greater proximity to nature.

Relating these findings to those on recreation reported above, it may follow that people "reserve" their love of nature for their leisure behaviour, while in their settlement behaviour it is less influential. It would seem to be of interest in this context that when subjects were asked to rate natural landscapes with regard to how much they would like to "see and visit" them and how much they would like to "live permanently" in them, the preference scores obtained under the latter instruction were consistently and significantly lower across all subject groups (Balling & Falk, *op. cit.*, pp. 15-16).

The paucity of personality related research is surprising considering that it is often accepted that in landscape perception, if not in relations with nature generally, "internal influences" such as personality are important (Nicholls & Sclater, 1993, p. 41). Of course many researchers working on the people-nature relationship such as human geographers and environmental and possibly social psychologists may have limited experience in personality research.

#### **Transient personal traits - moods**

The same deficiencies in identifying personal factors in research studies as described above would seem to apply to the area of transient influences on

people's relation with nature. For example it is "currently accepted" that moods influence perception of landscape quality (Nicholls & Sclater, op. cit.). However, there do not appear to be any studies which have investigated the effects of mood on people's landscape ratings or, indeed, on any other transactions with nature.

Traditional medical knowledge, though presumably largely forgotten, suggests that mood can influence these transactions quite profoundly. Thus Constantinus Africanus (circa 1020-1087), in his recommendations for the treatment of melancholia, suggests that the patient be taken on gentle walks and exposed to pleasant natural surroundings because this will help to improve her/his mood. Moreover, he warns of certain types of scenery such as rocky formations because, while they may stimulate and invigorate the spirit when it is not weighed down by melancholia, in its melancholic state it may react with fright and as a result be pushed back into even deeper despair (L'Africano, 1959). It is unlikely that such differential reactions to nature is limited to morbid mood states.

The brief review confirms that the range of possible factors that influence the relationship between human beings and nature is broad. Scientific research in this field is surprisingly scanty, especially considering that there are so many aspects to this relationship, and it is disappointing that only very few of these aspects, such as natural landscape perception, have been studied in any detail.

### **2.3 IMPLICATIONS OF PERSONAL AND CULTURAL DIFFERENCES ON INTERPRETATION OF RESEARCH**

Considering that people's relationship with nature may vary according to a number of characteristics, it is likely that their susceptibility to its psychological effects may also vary. This has hardly been addressed at all by researchers. Furthermore, even when personal attributes are introduced as independent variables, usually only one aspect is considered (e.g. being a backpacker), which means that the subject samples are still relatively undifferentiated. This has had the advantage that the findings of such studies can perhaps be generalised to a fairly wide section of the population but it may also have led to a masking of important relationships.

These undifferentiated samples, which are usually quite heterogeneous, tend to be typical of research carried out in the field. Most of the samples used in the experimental studies cited, on the other hand, are very homogeneous in that they consist of student populations. Students are commonly employed as subjects by psychologists in their research because of their ready availability. However, they are of course quite unrepresentative of the general population and may also be unrepresentative of sub-populations (e.g. student backpackers may differ from other backpackers in variables such as age, socio-economic status etc.). This limits the extent to which the results of these studies can be generalised.

Another limitation to the generalisability of these findings may be that most of the studies quoted below were carried out in the United States. There are though, some investigations which were conducted in other countries, an example being one of the experiments by Ulrich (1981) on the emotional effects of exposure to nature, which took place in Sweden. These have tended to produce results which are consistent with those of the American studies. The American findings may be assumed to be most likely to to other Western developed countries.

Another constraint, which ought to be borne in mind in the evaluation of the research findings reported, is that the studies were carried out in a variety of nature settings. The number of studies related to urban areas is extremely small so that it would have been impossible to rely only on them in this review.

The assumption we have made when using such studies is that the psychological influences of exposure to nature would be basically very similar, regardless of the physical context within which this happens. This is likely to be an oversimplification, but there is some empirical evidence which suggests that it may nevertheless be roughly correct. For example Wyman (1985) found that the memorable nature experiences, which adults reported in their environmental autobiographies, occurred anywhere and were not restricted to particular types of settings.

Also it is of interest in this context that a study which examined issues surrounding the use of an inner city nature reserve in London furnished very similar results as did an American study investigating these issues for three city parks. It was found in the London study (Gudgeon, 1992), amongst other things, that people who had used Camley Street Natural Park had a very favourable view of it (*ibid.*, p. 21).

Furthermore even amongst local residents who had never visited it but who had heard about it, the overwhelming majority ascribed great importance to the park's existence even though they knew very little about it (ibid., p. 20, p. 24). The American results indicated very similar findings (Hayward and Weitzer, 1984, pp. 255-58). These parallels may not necessarily extend to the experiences which the two types of settings evoke in people, but they are nevertheless quite striking and would seem to indicate some commonality between them.

There would, then, seem to be justification for using the findings from research which was carried out in different nature settings as indications of the effects which natural urban landscapes can be expected to have on people. Ultimately though, the question as to whether the experience of "natural" nature is largely the same regardless of where it occurs, can only be answered empirically. It could, of course, be argued that what distinguishes settings such as city parks, natural urban landscapes and wildernesses is the "amount" of "natural nature" which they contain. Of course there are also difficulties in defining "natural nature", some of which were already mentioned in the introduction (section 1.1) and these can be resolved in different ways according to the discipline within which the definition is proposed (see for example, Murie, 1972, for a possible ecological definition, and Lamb and Purcell, 1990, for one based on psychological reactions).

## **2.4 POTENTIAL FOR CHANGE OF THE RELATIONSHIP BETWEEN HUMAN BEINGS AND NATURE**

**The need for environmental education, and the problems of defining successful education.**

We have seen that the relationship between human beings and nature varies under the influence of factors such as time, culture, individual disposition, and circumstances. This raises the question as to whether a change in this relationship could be brought about intentionally, and, if so, how? This question has significance not just with regard to the issue of human well-being (if this is enhanced by contact with nature, then a positive relationship fostering such contact would obviously be desirable), but also with regard to the very existence of humans and nature. It was underlined at the Rio Summit, 1992, and had been clearly stated already in the World Conservation

Strategy (1980), that a change in human beings' relation with nature involving a more sustainable approach to the utilization of its resources is imperative.

Familiarity has been highlighted above as a factor of importance in determining attitudes to different natural settings. However increasing familiarity may not always lead to acceptance. For example if everytime an urban habitat is viewed it is perceived as 'wasteland' then this merely reinforces preconceptions. However if a person could be in some way educated or inspired to 'see' that landscape as an 'urban common' a change in attitude may result.

A major attempt to influence people's relations with nature has been made in the field of environmental education and interpretation. A basic premise of much of this educational activity is that more knowledge about nature will increase the love and respect for it. However investigations into the effectiveness of environmental education programmes have shown that the relationship between knowledge and positive environmental attitudes and values is at best unclear (Iozzi, 1989 p5) Thus it was found for example by Alaimo and Doran (1980) that student's knowledge about the environment increased with attendance of science classes over a two year period but there was no change in concern over the environment. Kinsey (1979) reported that additional knowledge tends to be used to develop more powerful arguments for previously held environmental attitudes. "People tend to integrate the concepts learned into strong support for the value decisions they previously made on the issues" (Iozzi, op. cit, p6). Of course the nature and approach to teaching may influence this finding.

That knowledge, or information, is used in accordance with previously held views is also suggested by a study which dealt specifically with wild areas in a city (Burgess et al 1991). People's responses to television coverage of a conflict over development of Rainham marshes was studied through 'in-depth group discussions'. Local people, who were either uncommitted or actively hostile to the case for conservation, dismissed information provided in the programme on the importance of the site for wildlife. This was on the basis of their own experience of the area which was perceived as little better than "a rubbish tip, radioactive in places and populated solely by gnats and rats" (ibid p 513) and "without any natural value" (ibid p 573). On the other hand the local people who were members of environmental organisations and who were strongly in favour of conserving the site did not contest the information, although both groups felt that the documentary was 'biased' towards the conservation case.



However there are also studies on environmental education which found a positive relationship between environmental knowledge and environmental attitudes and values. Thus Fortner and Teates (1980) found a significant relationship between knowledge of the ocean and attitudes towards marine issues. Ramsey and Rickson (1976) reported that increasing knowledge about the nature and causes of pollution seemed to bring about more positive attitudes towards pollution abatement. These authors pointed out the 'circularity' which may exist between attitudes and knowledge, in that knowledge may lead to the initial development of attitudes which, in turn, may lead to further gains in knowledge. This could partly explain the findings of the study on Rainham.

The initial formulation of attitudes may take place quite early in life, as was suggested by Miller (1975) who found that such attitudes are formed to a large extent at the elementary school level. In addition we can expect that the most effective interpretation will not be that which just efficiently imparts information, but rather that which evokes responses at a deeper level. Although psychological research findings are equivocal in respect to the value of education this must in part reflect the multiple levels of interaction that occur between a teacher and a pupil. A good educator may not always be simply efficient at providing information, he or she may also act as a role model or in many ways may attempt to re-inforce attitudes or behaviour.

### **Achieving behavioural change**

If the relationship between knowledge and attitudes is tenuous, the connection between these and behaviour is even more complex. Thus Borden and Schettino (1979), for example, found that environmental knowledge had a relatively small effect on people's willingness to adopt responsible activities and Lucas (1980) concluded after an extensive review of the literature that evidence that attitudes lead to appropriate behaviour or action is not strong. It would be of interest in this context to consider the degree to which just knowledge about the endangeredness of wild animals influenced the change in fashion away from wearing fur coats, as distinct from fear of attack and social ostracism.

This is consistent with research into other areas of psychological enquiry where it has also been found that there is not necessarily a high correlation between knowledge, attitudes and behaviour (c.f. Bandura 1971; Festinger 1964). Examples are the field

of psychotherapy and race relations where the limitations of knowledge or insight for bringing about attitudinal or behavioural change have been painfully evident.

In the latter fields exposure to the respective relevant situations have proved to be more effective for changing maladaptive and/or undesirable functioning than enhancement of knowledge, although care needs to be taken that the experiences involved are positive ones. It is likely that the same applies to nature. Thus research findings suggest that outdoor education is an effective way of improving environmental attitudes and values (Iozzi, *op. cit.*, p7). However it was found in a study of the reactions of inner city children to a days visit to a nature centre that the environmental attitudes of the girls actually declined (Kostka, cited in Newhouse 1990). The author attributed this to the girls' erroneous expectations of what they would encounter in the nature centre, and underlines the importance of ensuring that experiences are positive.

Exposure to, or contact with, a natural environment would in many cases involve physical interaction with the site, and it is of interest in this context to remember that attitudes may follow behaviour (e.g. Bem, 1971) and that therefore behaviour change is a potent agent for attitudinal change. However it has also been pointed out that even connected types of behaviour are not necessarily consistent, and furthermore some people are not always free to choose the behaviour they would most prefer because of external constraints (O'Riordan, 1976 p 26). Thus the relationships between different behaviours, and between behaviours and attitudes, as well as those between knowledge and contact with nature, link in complex ways to attitudinal and behavioural changes. These remain important areas for study.

Other methods which have been used in attempts to bring about changes in attitude or behaviour in people, besides enhancing knowledge and exposure, are modelling, reinforced behavioural performance and classical conditioning. None of these seem to have been used systematically or to any large extent in the field of human-nature relations.

The effects of modelling have been studied particularly extensively in children, although there are also investigations with adult subjects. Modelling (Bandura, 1977) involves the presentation of a person, either *in vivo* or audio-visually, who displays the attitudes and behaviours which it is intended to foster in the observer. Modelling

has been found to be a powerful method for bringing about change, depending on a number of factors.

In conservation research, modelling has been investigated in the context of wildlife education programmes where it was found to be the most effective technique in producing attitude change towards snakes (Morgan and Grahann 1988, cited by Newhouse 1990, p29). Furthermore there is anecdotal evidence to suggest that this may be a powerful method for influencing the human-nature relationship. An example comes from a report given by the captain of a pirate vessel (the "Shepherd II"), which used to combat whalers and drift netters ("Defenders of the Wild", channel 4 TV programme, 18. April, 1993). The captain of a whaler, which his ship had sunk by ramming, apparently told him afterwards that he would like to join the anti-whalers, having witnessed the extent of their determination to protect the whales. On a less dramatic note, rangers in nature protection areas may set examples to the public of nature-caring attitudes and behaviours. Considering the great effectiveness of modelling in influencing people's reactions and behaviour under certain circumstances, its application and investigation in the context of nature relations would seem to be a potentially very fruitful area of research.

The effectiveness of reinforced behavioural performance in bringing about change has been amply demonstrated in studies on psychological disorders (c.f Libermann and Raskin, 1971) and on other aspects of behaviour, such as appropriate disposal of litter, recycling and sharing private transport (c.f. Coyne & Hayes 1977 pp 134-155). However there does not seem to be any research which has examined the potential of reinforced behaviour for bringing about a change in the relationship between humans and nature.

Indirect evidence of the effect that rewarding or not rewarding behaviour can have on people's attitudes to nature is provided by a study on the benefits of participation in urban wildlife projects (Mostyn, 1979). It was found that several of the youngsters who participated in local conservation groups, an activity which rewarding to them, intended to take up nature-related careers (ibid., p. 59). While it is probable that these youngsters had already positive attitudes towards nature prior to their involvement in the wildlife projects the conservation work further increased their commitment to it. (The respondents felt that their current participation in the conservation work was a

result of having been taught in primary school to respect the environment (ibid. p. 58).)

The use of classical conditioning for changing a person's relationship with an animal, if not with the whole of nature, has been demonstrated in experiments on the formation and treatment of animal phobias. In a famous; or infamous, experiment Watson & Reyner (1920), induced fear of a white rat in an eleven-months old infant through pairing its presentation with a loud and unexpected noise. Prior to the experimental procedure the infant had shown approach behaviour (reaching out) towards the rat, and a fear reaction to the noise. The induced fear reaction persisted for at least one month and spread, in a milder form, to other "furry objects", such as a dog, a rabbit and a fur coat (Beech, 1971, pp.27-29).

In another classic experiment (Jones, 1924) it was shown that strong negative reactions to animals, such as fear, can also be eliminated by conditioning procedures. Children who showed a marked fear to the presentation of various animals were given sweets as a means of eliciting a pleasurable response, and while they were occupied with eating, the feared object was introduced and gradually brought nearer. If this was done with sufficient care, the child began to tolerate the close presence of the feared animal or even enjoy its proximity (Beech, op. cit. pp. 29-30).

Conditioning procedures would, then, seem to be powerful methods for changing a person's relationship with at least parts of the natural world. (There have subsequently been long discussions about exactly which type of conditioning was involved, especially in the case of Jones' experiment, but these need not be of concern here.)

Whether it would be desirable and feasible to use them on a larger scale, or to manipulate more complex and subtle emotional responses, remains an issue for debate and research. Some practices, such as placing sculptures into the natural landscape, could be fruitfully conceptualized in terms of conditioning procedures, associating these settings with ideas of 'culture and beauty' or at least 'care' rather than 'abandonment'. These may enhance human pleasure and well-being in natural settings, which might lead to a greater acceptance of or even affinity with nature in general. However such additions may also be abhorrent to some and may undermine for others

the qualities that they seek from the setting (e.g. a sensation of being removed from human culture).

### 3. HUMAN WELL BEING AND NATURE

The relationship between human beings and nature has been, and is, a variable thing as discussed above. Regardless of this there is a "deeply founded notion" that contact with nature provides a range of benefits to people (Parry-Jones 1990 p7). This has been alleged to apply particularly to urban dwellers (c.f. Olmsted 1870, p23) and it has served as an argument for the provision of green areas in cities and the urban fringe (Ulrich 1979, p17). This section will examine whether the notion of the such benefits from nature can be supported by scientific evidence.

#### 3.1 WHAT IS PSYCHOLOGICAL WELL BEING?

Much of the literature that suggests that human beings benefit from nature makes reference to "well-being" (Parry-Jones, op. cit). Few authors specify what they mean by this term but it would appear that the majority have in mind a psychological state although there of course some who also refer to physical health (c.f. Robinson, op. cit, p30).

Psychological well being is a rather vague concept (Parry-Jones, op. cit, p7) and it shares the problems of definition with the concept of 'mental health' to which it may be related. Psychologists, who might be expected to be most concerned with such a concept, have in fact become interested in it only recently. Mostly they have been almost exclusively preoccupied with the negative aspects of human functioning such as 'abnormality', 'disorder', 'dysfunction' and 'handicap'. In a general context, psychologists' definitions of well being tend to be rather broad and all-encompassing such as that of Costello & Costello (1992 p2) who stress that it is "not merely survival but growth and fulfilment which are paths to self-actualization". In the context of research into psychological well-being the concept tends to be equated with 'happiness' or related ideas (c.f. Diener 1984, p542-43). Definitions of happiness or well-being fit into three categories: normative, subjective and affective.

Normative definitions involve external criteria such as virtue and holiness; these determine what is desirable (ibid. p543). When a person's life matches this value framework then s/he is said to lead a happy life. An example related to nature would be the eighteenth century notion, first given prominence by Evelyn in his book 'Sylva' that planting trees is a virtuous act. The landowners who followed this call for

afforestation would accordingly have been virtuous, and their dealings with trees would have lead them to happiness or well-being. In modern western society normative definitions of happiness are not very prevalent although they do appear to have retained something of a foothold in nature conservation, if only in a somewhat disguised or implicit form. (Thus it is possible to get the impression that planting native rather than exotic trees is virtuous and not merely opportune or desirable.)

Subjective definitions of well-being have become popularised during the last century, although they can be traced back to antiquity. They involve an assessment by the person her/himself, applying her/his own chosen criteria which is usually global and encompasses all aspects of life (although various time frames may be chosen). Subjective well being is defined in terms of a person's satisfaction with life, or her/his judgement of the quality of her/his life (Diener, op. cit, p543-44).

Affective definitions of happiness or well-being stress pleasant emotional experience involving a preponderance of positive over negative affect (ibid, p543). They are closest to the everyday use of the term happiness. There does not always appear to be a clear distinction between subjective and affective concepts of well-being, and positive affect is often studied by the same researchers who are interested in subjective well-being. Nevertheless it remains a question for empirical investigation as to how the two concepts are related, as suggested by Diener (ibid, pp543-44).

### **Research into the overall relationship between nature and well-being**

There does not seem to be any study which has specifically focused on the relationship between people's contact with nature and their subjective or emotional general well-being. However there is an investigation into multiple aspects of human well-being which has included items relating to nature. This is the extensive study into emotional evaluations by Andrews & Withey (1976). People were asked to indicate, using a seven point Delighted-Terrible scale, how they felt about their life in general and about specific concerns. Amongst the latter were "your closeness to nature", "outdoor places you can go in your spare time", "nearby places you can use for recreation or sports", "the sports or recreation facilities you yourself use, or would like to use - I mean things like parks, bowling alleys, beaches", "the condition of the natural environment - the air, land and water in this area" and "the weather in this part

of the state" (ibid, p34). It is likely that feelings pertinent to nature conservation were most directly evaluated by the first of these.

Mapping techniques based on co-variance were used to identify the structure which these "concerns" assumed in people's evaluations (ibid pp35-42). Based on their closeness to each other in a three dimensional structure "concerns" were grouped into "regions and "sub-regions". Not all of the "concerns" fell into such groupings. Amongst those which did not were "closeness to nature", "condition of the natural environment" and "weather". The remaining three concerns cited above, e.g. "nearby spaces", were subsumed into "recreation facilities".

The authors suggest that one of the dimensions of the map reflects closeness to the self, going from "concerns" involving reference to self adjustment to relationships with other people, family members and health; then to one's job, money and house; then to one's community and to its various services and facilities, including those for recreation, and finally to one's local and national governments, societal standards, media and taxes (ibid p42). On this dimension "closeness to nature" figures more or less on the same level as "job" and "money", slightly closer to "self" than these. "Condition of natural environment" is located close to "local " and "national government", while "weather" is slightly further away (ibid pp 38-39).

Relating the "concerns" to general well-being, it was found that those which were most closely related included feelings about the fun, enjoyment and interest of one's life, one's own efficacy, accomplishments and adjustments; one's marriage; how one is treated and accepted by other people; economic matters such one's income, standard of living and the extent to which one's physical needs are met. "Concerns" which bore little relationship with well-being included local government, media, weather and condition of the natural environment. The authors conclude from this that global well-being is influenced by matters in which the person is immediately and personally involved, while matters which are more remote from one's immediate personal life are less influential (ibid, p111).

"Closeness to nature" was unfortunately not included in the this latter analysis (many other "concerns" were also dropped). However inferences can be made with caution. Since the closeness of the relationship between the "concerns" and global well-being seems to follow roughly the dimension of closeness to self described above, and since



"closeness to nature" figured moderately close to self, one could speculate that it would have a similar standing to well-being. Future research could perhaps substantiate this.

(This study may also provide other valuable insights. For example the implication is that 'nature' will take on a greater importance and have greater impact if interpretation can present it as enjoyable, interesting or fun, and an integral part of people's daily life, but it may be seen as relatively unimportant if associated with the more objective concepts such as 'health of the environment' despite what is, objectively, the greater importance of these issues.)

### **Other influences on subjective well being**

Some more specific investigations which have studied aspects of human well-being and their responsiveness to exposure to nature; these will be reviewed in the following sections. Before moving to this, it may be valuable to give a brief overview of the main research into subjective well-being since this will provide a context for the findings in regard to nature.

So far, few of the potential influences on happiness have been tested empirically (Diener op. cit, p552). Research in this area has focused initially on demographic variables, but characteristics such as age, gender, race education and intelligence have not been found to be highly related to subjective well-being. Accordingly other areas have been explored and the general outcome of these efforts has been that people's reported well-being tends to be more closely related with the evaluation of the conditions of their lives than with the objective reality of those conditions (e.g. subjective health shows a stronger relationship to happiness than objective health - Zautra & Hempel, 1983).

However there are some objective measures for which a link has been observed. One of these is income, although its effect is small when other factors are controlled through which it may exert its influence (e.g. better health). Moreover the relationship between income and well-being may not hold up very well across countries and across time. Thus there is a suggestion that "Latin American countries are in some respects happier than European countries" and "Japan is not much happier than India". Also

during a time period when real income in the US rose dramatically there was absolutely no increase in average reported happiness (Diener op. cit, p553).

Another objective measure which has been found to be related to subjective well-being is employment status, unemployed people being the unhappiest group even when income differences were controlled (Campbell et al, 1976). The findings on marital status have been conflicting, with some studies having failed to find statistically significant effects of marriage on subjective well-being while others reported that married persons indicated greater subjective well-being compared to any category of unmarried people (Diener op. cit, p556). It may be relevant in this context that love, "an intense form of friendship", was found to be related to well-being in a number of studies and one showed it to be "the most important resource for happiness" (ibid p557).

Other variables which have been examined include religion, social participation, involvement in activities and personality characteristics such as extraversion and internality. The results of the respective studies have been conflicting or complex (ibid p556-560). However there is one variable which has been identified in several investigations as one of the strongest predictors of subjective well-being. This is high self esteem (ibid p558) which would suggest "people must have self esteem to be satisfied with their lives" (ibid, p552).

Thus there would appear to be a great number of aspects which may be related to well-being, and it is probable that the research so far has not yet identified them all. Accordingly Diener concluded in his review that "it seems likely that subjective well-being will not be accounted for by a handful of potent variables because of the immense number of factors that can influence it", and that "it is unrealistic that any one will be prepotent" (ibid p561). This presumably applies to nature as well, and its possible influences on human well being will be examined next.

### **3.2 SPECIFIC ASPECTS OF THE EFFECT OF CONTACT WITH NATURE ON HUMAN WELL-BEING: PHYSICAL EFFECTS**

The majority of writers who allude to the effects of nature on human well-being refer to psychological well-being. However some research deals with the physical effects of nature and its implications for human physical health.

The presence of vegetation in cities can have powerful effects on environmental characteristics such as climate and air and water quality which can in turn affect the health of the population. There is a growing body of literature on the issues involved, which are often complex and hard to investigate because of indirect and multi-faceted relationships between factors. The evidence obtained is usually correlational and thus open to alternative interpretations. Nevertheless there would seem to be little doubt that these factors and characteristics do profoundly affect people's physical condition.

### **Air quality can affect well-being in subtle ways**

The current review can not address in detail the literature relating to factors such as vegetation, air pollution and their health implications. However it is important to bear in mind that even people's transient physical states (and as a consequence probably their moods and happiness) can be directly affected by such global environmental variables as air quality. Similarly mood and psychological state can influence physical health. It is appropriate in this context to look at examples where physical health could be influenced by what are presumably psychologically-mediated processes.

To illustrate this, there is a study which is rather unusual in that the air quality was actually experimentally manipulated (Winslow & Herrington, 1936). The food consumption of young men who visited the researchers' laboratory was influenced by the odour of heated house dust which, though relatively mild, is "often noted as subjectively undesirable" (ibid, p145). The odour was introduced gradually so that the subjects did not perceive it. The results were complex but the main finding of concern was that there was a very clear influence of the odour on the subject's appetite, which was reflected in a significant decrease in average food consumption. Thus transient physical states can be affected by what may appear to be a fairly harmless agent in the air, with possible longer term implications for health. It would be intriguing to speculate what effects the fragrances of cut grass, flowers etc. may have on appetites and other aspects of physical and psychological well-being. There do not seem to be any studies which have investigated these aspects of 'air quality'.

### **The effects of views of nature on health**

The impact of fragrances and odours may not seem far fetched when it is recognised that nature apparently affects people's physical well-being through its mere presence

or visibility. It was found in a widely cited study by Ulrich (1984) that occupancy of hospital rooms with a window which looked out onto a small stand of deciduous trees had more beneficial effects on patients' recovery from gall bladder surgery than occupancy of rooms where the view out of the window was onto a brown brick wall. Data collection was restricted to between May and October of the respective years because the trees had foliage during those months.

The results showed that patients with a view of trees had a significantly shorter stay in hospital, took significantly fewer moderate and strong analgesic doses during days two to five after their operation and had significantly fewer negative nurses' notes (for example negative might be "upset and angry", positive might be "in good spirits"). There was no significant differences between the groups in terms of doses of anti-anxiety medication, which was attributed to fact that analgesics produce drowsiness and sedation as side-effects which would have reduced the need for anti-anxiety drugs by the patients who were viewing the wall. The differences in minor complications experienced by the two patient groups was not significant either, but there was a trend in the expected direction.

Ulrich concluded from his results that "the natural scene had comparatively therapeutic influences" (ibid p421). He himself pointed out that the "built" view was "a large featureless brick wall" implying that this may not have been representative and that more varied city views such as a lively street may be more therapeutic for at least some patients (e.g. those that suffer from underarousal). Other writers have commented on the shortcomings of the investigation, especially its retrospective and correlational nature (e.g. Parsons, 1991 p3). Despite these criticisms it is generally accepted that the study provides at least a suggestion that exposure to natural as opposed to built scenes may have restorative effects, and this would not seem to be unreasonable.

The assumption that trees are most likely to be potentially therapeutic, when they are in leaf is arbitrary to say the least. It also raises the question as to whether the beneficial effects on the patient's recuperative process are attributable to the 'naturalness' of the view or to other variables such as differences in colour (see below).

Beneficial effects on health of a natural view from a window were also suggested by the results of a study on the frequency of inmate's attendance on the health care facilities of a prison (Moore, 1981-82). A range of variables were studied, but the finding of interest, which was quite unexpected to the researcher, was that prisoners who occupied cells which had windows facing countryside outside of the prison used the health facilities less often than prisoners who inhabited cells facing inwards. The author interpreted his finding in terms of stress-reduction which the natural views may provide to the prisoners, who therefore do not have to resort as often to the nurturing and psychological support provided by the sick rooms.

In another study on prisoners (West 1985, cited by Ulrich and Parsons 1992, p101) inmates who had views through their cell windows of nature were compared with others who had views of prison walls, buildings or fellow prisoners. It was found that the former suffered less often than the latter from symptoms such as headaches and digestive upsets.

#### **Possible mechanisms of influence on physical well-being**

It has been suggested that natural views exert their evident positive influences on human health through emotional effects (Ulrich 1984, p420; Ulrich et al 1991, p204). Research into the relationship between the exposure to nature and emotion will be discussed in more detail in the following section. There is no need to detail the hypothetical processes involved, except perhaps to say that it is thought that ultimately the production of stress hormones cortisol and corticosterone is affected which has suppressive effects on the immune system. Nature stimuli are believed to result in decreased production of these hormones. Parsons (op. cit p17) admits that the ideas put forward are "an exercise in speculation", and there would seem to be a considerable leap from the observed data to the hypothesized process, especially since the intermediate links are other theories rather than based on data. Nevertheless this is an interesting line of enquiry to pursue and should be open to empirical investigation.

Speculation about the mechanisms involved is tempting considering the potential importance of a link between health and contact with nature. Health care has become increasingly concerned with the prevention as well as the treatment of diseases. Correspondingly the 'pathogenic', or medical, model, which focuses on agents which

cause and alleviate or cure illnesses, has been complemented by the 'salutogenic', or health, model which deals with factors that prevent disease and contribute to physical well-being (e.g. Antonovsky, 1979). Health, or at least physical well-being, is conceptualised within the latter as a continuum where a shift towards the disease end will eventually lead to the breakdown of health. Attention is directed at the conditions which may protect the individual from such breakdown.

A salutogenic model would seem to be particularly appropriate for conceptualising the health effects of contact with nature, since these are evidently not only restorative (c.f. the hospital study) but also preventative (c.f. the prison studies). A major salutogenic model has been put forward by Antonovsky who actually coined the term (ibid, p13). His starting point is the question as to why people should stay healthy, considering the fact that they are constantly exposed to the 'bugs' and psychosocial stressors which have been identified as pathogenic agents by the medical model approach (ibid pp35-36). The answer he gives is that stressors do not necessarily cause 'stress'. Rather they elicit in the organism a state of tension, and this can have either pathological, neutral or salutary consequences. Whether a stressor leads to stress, with its pathological consequences, or to a tension resolution which does not have such consequences, is determined by the way in which the organism deals with the state of tension. Good tension management pushes the person towards the health or ease end of the continuum, while poor tension management leads to the stress syndrome (Selye, 1976) and moves her/him towards the disease end of the continuum (Antonovsky op. cit, p70-71).

The kind of tension management a person is able to resort to depends on the "general resistance resources" which are at his/her disposal. These can be manifold (for a discussion see ibid pp 98-122) but what unites them conceptually is that they all contribute to a sense of coherence (ibid p122).

### **The importance of a personal 'sense of coherence'**

Thus a "sense of coherence" is the central variable of Antonovsky's model. It is defined as "a global orientation that expresses the extent to which one has the persuasive, enduring though dynamic feeling that one's internal and external environments are predictable and there is a high probability that things will work out as well as can reasonably be expected" (ibid, p123). (The sense of coherence is not

to be confused with the sense of being in control, "what is important is that the location of power is where it is legitimately supposed to be" - *ibid* p128 - which implies that it will be used "in ones own interest" *ibid* p155.)

A strong sense of coherence can act as protection against health breakdown in three ways. Firstly it can help one avoid exposure to some stressors by drawing upon one's generalised and specific resistance resources. (It might be thought that "generalised resistance resources" and "sense of coherence" are circular concepts but they are defined and can be measured independently - *ibid* p190.) Secondly a sense of coherence might help one perceive as innocuous or even desirable stimuli which others may perceive as stressors. Thirdly by mobilising one's general resistance resources, states of tension can be resolved and consequently will not develop into states of stress (*ibid* pp193-194).

Ultimately the sense of cohesion is thought to influence the immunological balance of the organism through its intervention at the level of tension management/stress prevention (*ibid* p181) but this link is not elaborated.

There is not room here to discuss evidence in support of Antonovsky's model but if it is accepted that a strong sense of coherence may be an essential determinant of a person's position on the health continuum and exposure to nature is seen as positively influencing the latter, as is suggested by Ulrich, Moore and West as cited above, the question arises as to whether contact with nature can influence people's sense of coherence?

There is some anecdotal evidence that this is the case. Thus Little (1975) reports, from his discussions about the value of landscape with groups of inner-city, suburban and rural residents, that a reason given for preservation was that natural features, such as a river for example, gave a "sense of security - we look at the natural order of things as ongoing" (*ibid* p56). The author suggests that the "permanence of 'the natural order'" gives a feeling of "natural dependability" to contemporary citizens who are exposed to an inordinate amount of change.

Accordingly it would seem that people feel that nature can introduce an element of reliability in an uncertain world. It can provide "a relatively permanent frame of reference which can allow change to occur without the sense of being lost in the

process" (Stainbrook 1968, p5 cited by Stillman 1975, p20). Furthermore it has been suggested that in current western culture the concept of nature entails the notion of "an external system - basically supportive - in which each of us has a place" (ibid).

Thus it would seem that nature can signify to people both predictability and "propriety" (Stillman op. cit p20), which are both components of the sense of coherence. Of course although nature's overall changes may follow seemingly predictable patterns which can be construed as "legitimate" and beneficial, there are also hazards such as storms and floods etc. which can bring destruction. The concept of sense of coherence can accommodate this, because it does not rely on positive outcomes but merely on outcomes which are as good as can be expected.

It seems then that exposure to nature may enhance one's sense of coherence and thereby influence one's position on the health continuum. It is interesting to consider what the effects may be on 'sense of coherence' of types of environmental education which depict the fragility of nature. These may undermine people's sense that nature's permanence and capacity can accommodate change. On the other hand one may wonder whether people's apparent amazing equanimity in the face of information about environmental degradation is related to their trust in the permanence of nature, which they cannot allow to be eroded because of the threat this may pose to their personal sense of coherence.

The above conceptualisation of the beneficial effects of nature on human physical well-being is again speculative, and again relies on the mediation of a model which itself still needs to be validated. However it is open to empirical investigation.

## **Conclusions**

The detrimental effects on human physical health of global environmental variables such as air pollution are being increasingly studied. In contrast there are still only very few studies which have examined the possible beneficial influences of nature on people's health status. Yet the few studies which have been carried out suggest that just visual exposure to nature may have powerful preventative and curative influences (see section 3.2).



These studies are of course very preliminary in that they tend to have methodological shortcomings and also often define "nature" in a curiously limited way (e.g. Ulrich's hospital study). Nevertheless they would certainly suggest that this is a field of investigation, which ought to be vigorously pursued because of the likelihood of positive findings.

Some principles may have far-reaching implications. For example one aspect of urban wildlife that has been identified as being of possible importance is its illicitness which implies a power of recovery and of sustainability - the sense that 'nature' is surviving within towns implies that it is capable of regeneration and this in turn may be an important aspect of its influence on people's 'coherence'. This latter relationship ought to be investigated empirically - there are so far no systematic studies which have examined the link which may exist between a person's sense of coherence and her/his nature perception and experience (Section 3.2). However it is obvious that attention needs to be given to the way in which ecological problems are presented to people.

### **3.3 SPECIFIC ASPECTS OF THE EFFECT OF CONTACT WITH NATURE ON HUMAN WELL-BEING: PSYCHOLOGICAL EFFECTS**

As mentioned, it is more common to find literature implying 'direct' psychological benefits from contact with nature than improvements to physical well-being, although the latter is often mentioned in passing.

Within the psychological sphere five areas can be distinguished - the emotional, the cognitive, the behavioural, the developmental and the social. This distinction is purely conceptual since in reality psychological functioning is holistic and a separation of its various components will rarely occur. However it is helpful to examine the differently areas separately. To do so necessitates some arbitrary decisions on allocation of research findings as these are usually relevant to more than one area. To avoid extending the discussion inordinately different studies have been cited to illustrate different aspects.

### 3.3.1 Emotional effects

It was reported above that psychological well-being has been defined in various ways (section 3.1). The definition closest to common sense is the affective one, where well-being is equated with a preponderance of positive feeling states.

One of the main benefits which contact with nature is alleged to have for human beings is a positive effect on mood. However it is only fairly recently that attempts have been made to investigate these emotional effects scientifically, and even more recent are attempts to examine them experimentally. The researcher who has probably been most closely associated with the latter work is Ulrich.

#### Ulrich's slide based experiments

Ulrich tried to test the validity of "the notion that exposure to nature is psychologically healthful" (Ulrich 1979, p17). He carried out experiments in which the effects of visual exposure of outdoor environments depicted on slides were measured. Visual exposure, he suggests, is an appropriate form of contact with nature for investigation because "vision is by far the most important sense in terms of yielding information about outdoor environments" (Ulrich 1981, p524), and the justification of using slides as surrogates for real views is indicated by the response of participants in a number of research studies (Ulrich 1979, p17).

In the first of a series of three experiments the subjects were geography students who were mildly stressed at the time because they had just taken a one hour examination. The sample was split into two groups, one of which was shown slides of unspectacular nature scenes dominated by green vegetation and the other was shown slides of urban scenes depicting primarily commercial and industrial areas which had no natural elements in view. Before and after viewing the slides the subjects filled in the Zuckerman Inventory of Personal Reactions or ZIPERS (Zuckerman 1977) which is a mood inventory which measures five factors: Fear Arousal, Positive Affect, Anger/Aggression, Attentiveness-Coping and Sadness.

The analysis of the data obtained prior to the slide presentation indicated that the two subject groups did not differ significantly with regard to their mood states. Both showed a slightly higher level of Fear Arousal and Anger/Aggression and a slightly lower level of Positive Affect than was obtained during normal class sessions. Two types of analysis were carried out to examine the changes which might have occurred from before to after the slide presentation; one examined the data of each group individually and the other compared the two groups. Strictly speaking, only the latter is methodologically sound. It indicated that the subjects who had viewed the nature scenes had experienced an increase in their Positive Affect, this being due to enhanced feelings of friendliness and playfulness, while the subjects who had viewed the urban scenes had experienced an increase in their sadness.

The group exposed to the nature scenes was also found to have reported significantly less Fear Arousal, whilst the group exposed to urban scenes reported a significant decrease in Attentiveness. Ulrich concluded from his findings that while "stressed individuals feel significantly better after exposure to nature scenes", urban views "work against emotional well-being" (Ulrich 1979, p21).

The effects of exposure to slides on mood were further investigated in a second experiment (Ulrich, 1981) carried out on unstressed student subjects. Three series of slides each were prepared, one depicting nature with water scenes, one showing nature scenes dominated by vegetation and one consisting of urban views without either water or vegetation. None of the views were aesthetically spectacular.

The slides had been assessed prior to the experiment by different subjects who rated their aesthetic pleasantness and 'information rate'. On the basis of these judgements the series were matched for information rate, but it was not possible to match them for pleasantness as the views of nature, especially containing water, were rated far above the urban scenes. The slides also differed with regard to their predominant colours.

Two types of psychological measures were used, a questionnaire developed by Ulrich which assessed the factors Dominance, Wakefulness, Attention/Interest and Stability (of affect) and the ZIPERS. Two psychophysiological measures were also taken - the heart rate and an EEG recording of the alpha rhythm which reflects a level of cortical arousal which is associated with relaxed wakefulness. These latter measures were taken as indices of the subjects' state of arousal.

The subjects each viewed all three slide series on different occasions. The subjects rated their mood before and after each slide presentation. The psychophysiological measures were taken continuously throughout the session. The results showed that, regardless of which slide series the subjects had viewed, at the end the subjects scored significantly lower on Wakefulness, Attention/Interest and Dominance on Ulrich's questionnaire and on Attentiveness on the ZIPERS. Also there was a significant decline in alpha rhythm during the session which was thought to reflect a greater drowsiness of the subjects. Similarly a significant decline in heart rate was found. Thus the whole experiment had an arousal-reducing effect (which anyone who tries showing large amounts of slides to students can prove for themselves).

More important were the influences which the different scenes had had. Using Ulrich's own questionnaire the subjects' Attention/Interest decreased less after having viewed nature rather than urban scenes, although the effect was only significant for views including water. A parallel result was obtained for the Attentiveness scale of the ZIPERS. Furthermore on the latter system the subjects reported more Sadness after viewing the urban than the nature scenes, although once again the difference was only significant for the water views. Finally a significant difference was found between the two sexes with regard to their responses in Positive Affect; whilst the woman's level was markedly lower after viewing the urban scenes, declined less after their water slides and remained unchanged after vegetation views, the men's Positive Affect declined slightly regardless of the landscape category viewed.

The EEG recordings showed different results for the slide series in that the subjects' alpha amplitudes were consistently higher when they viewed vegetation rather than urban scenes. Exposure to water views only resulted in

significantly higher alpha amplitudes if the experimental sessions were conducted in the morning rather than the afternoon. No significant differential effects of landscape categories were found for heart rate.

Summarising the results Ulrich stated that nature slides, especially those depicting water had "more beneficial influences in psychological states" (ibid p548) than urban slides, the effects being specific to sadness and fear arousal. Consistent with this the EEG results indicated that "the most positive influences on well-being were produced by nature scenes" (ibid, p549). Relating these results to those of the previous study, Ulrich proposes "tentatively" that people benefit more from visual contact with nature when they are in states of high arousal and anxiety, although even unstressed individuals can be positively affected (ibid p550).

This interpretation is presumably based on the more positive response to vegetation scenes in the first experiment compared to the second. However given that the responses to water slides were positive in the second experiment, and given that water is a part of 'nature', it is perhaps more appropriate to state that both stressed and unstressed individuals can derive psychological benefit from visual contact with nature, although the mood effects may differ. The differences in methodology between the two studies makes further comparison difficult, but it is notable that the increase in sadness after viewing urban scenes is remarkably consistent.

Ulrich continued his investigations into emotional and psychophysiological effects in a third experiment (Ulrich et al, 1991). A stress-induction procedure was carried out on students which consisted of the presentation of a black and white videotape about the prevention of work accidents. Following this the subjects viewed a colour video depicting either natural or urban settings. Two natural and four urban settings were used. One of the nature settings was dominated by vegetation, while the other included a fast moving stream. The urban settings were a commercial road with moderately high traffic, the same road with only light traffic, a pedestrianised traffic-free outdoor shopping mall with many people and the same shopping mall with few people.

The ZIPERS test was administered three times: prior to the presentation of the stressor, following it and following the landscape tape. The psychophysiological measures recorded were the heart period, the pulse transit time (which correlates closely with systolic blood pressure), the skin conductiveness (which is a measure of the sweatiness of the palm) and the tension of the frontalis muscle of the forehead). While the first three measures are under the control of the autonomous nervous system, the latter is under the control of the central nervous system. All of these measures were taken continuously throughout the experimental procedure.

The analysis of the ZIPERS scores indicated that after having viewed the stressor video the subjects had felt significantly more Fear Arousal, Anger/Aggression and Sadness, while their Positive Affect and Attentiveness/Interest were significantly lower. The psychophysiological measures also reflected a stress reaction. Skin conductance, blood pressure and muscle tension increased significantly.

Again of particular interest was the effects that the landscape tapes had had. The ZIPERS scores obtained after the presentation of these showed that subjects who viewed natural settings as opposed to urban settings experienced significantly lower levels of Fear Arousal and Anger/Aggression and a significantly higher level of Positive Affect. The difference in Sadness was not significant although there was a trend in the expected direction with urban scenes resulting in a tendency to higher scores.

The psychophysiological measures indicated faster recovery from stress in the subjects who had viewed the nature sequences than in those who had viewed the urban settings. Significant differences were also found for the heart rates. In the people who viewed the nature scenes it decelerated whilst in the urban viewing subjects heart rate increased throughout the exposure to the tape.

Correlations were calculated between the various psychophysiological measures, and between these and the ZIPERS scores. A number of the correlations between the items of the Positive Affect scale and the autonomic measures were significant. It was concluded from this that there may be an association of enhanced positive feelings and decreased autonomic arousal

during stress recovery as a result of nature exposure, while muscle arousal decline is independent (ibid p222).

Summarising the results the authors stated that "subjects exposed to the urban environments experienced less recovery from stress as evidenced both by self-ratings and physiological responses" compared to subjects who were exposed to nature environments (ibid p223). Furthermore they point at the speed with which recovery occurred in the latter case which, they feel, makes it a highly relevant process for urbanites whose contact with nature may be brief (such as viewing trees from a car window). They also point out that the results can not necessarily be directly generalised to longer term periods of exposure to nature, particularly that which involves active participation. The psychological benefits of such circumstances require further investigation.

Taken together the findings of the three studies would seem to indicate that exposure to nature can have a marked effect on people's emotional state. Partly because of the differences in methodological approach it is difficult to know exactly what this effect consists of, but there would seem to be sufficient commonality between the results to suggest that a real phenomenon is being tapped.

### **Psycho-evolutionary theories**

The results of the above experiment are also discussed by Ulrich in terms of his "psycho-evolutionary theory" of environmental preference. It is suggested that "a critical element in restorative effects of nature scenes is a quick-onset positive affective reaction" and that a "theoretical perspective emphasising attention or 'fascination' is inadequate for explaining restorative influences of nature" (ibid p224). (This reference to 'fascination' relates to workers such as the Kaplans, some of whose work will be reported later.)

Ulrich (1977, 1983) developed this evolutionary theory to account for people's preferences for nature and considered his results to be supportive of it. According to his model human beings' initial response to an environment is one of generalised emotion which can be independent and primary to cognition and depends basically of 'like-dislike' feelings. This emotional

response may then sustain and shape subsequent cognition, which in turn can refine the general initial feeling reaction and may generate other emotions. It also motivates approach or avoidance behaviour, as is appropriate to the person's ongoing well-being. (Behaviour does not necessarily involve an overt action, it can consist of a passive pursuit like, for example, the contemplation of a stand of trees - Ulrich 1986, p30-32.) The 'like' or preference response to nature, and specifically to green vegetation and water, is conceived in terms of evolutionary utility in that basic elements characterise habitats in which human beings were able to survive and evolve successfully. Liking or preference of such environments is linked with approach behaviour which is considered to be adaptive (Ulrich 1983, pp 89-95).

It is difficult to evaluate evolutionary 'theories' such as Ulrich's, the Kaplans' (1989) "functionalist-evolutionary model" or Orian's (1980, 1986) "Savanna theory" (these descriptive terms are used by Parsons op. cit. p4) because they are general, vague and give the appearance of circularity. Perhaps an even more serious short coming is that, being retrospective, they are difficult to test.

Accordingly rather than focusing on variables such as evolutionary utility it may be more fruitful to examine factors which are currently operating and are therefore open to further investigation. One variable which clearly differed for the natural and urban views in Ulrich's experiments was that of predominant colour composition. Ulrich referred to this himself but did not pursue the possible implications.

### **Effects of colour on emotion**

From the experimental literature on colour effects it would appear that green is a less arousing colour than red using measures of skin conductance changes (Wilson, 1966). Similarly green was found to be less arousing than violet before habituation to both occurred (Nourse & Welch, 1971). In an experiment on the effects of green and red environments on task performance it was found that the subjects did significantly better on a Hand Tremor and a Motor Inhibition task under the green condition compared to the red (Nakshian, 1964). This was attributed to greater relaxation, or less



"excitation", which occurred with green and facilitated motor control (ibid p158).

The less arousing character of green is also reflected in people's subjective judgements of colours. Thus it has been found that subjects rate long-wavelength colours as more arousing than short wavelength colours (Walters et al, 1982). People tend to prefer greens and blues over reds and yellows (Russel & Snodgrass 1987, p261; McManus et al 1981) and this applies cross-culturally (Adams & Osgood, 1973). Furthermore similar preferences were demonstrated by monkeys and pigeons using behavioural measures (Humphrey, 1972; Sahgal et al 1975; Sahgal & Iverson 1975). This "tempted" McManus et al to suggest "that there may be some underlying biological origins to such generalised hue preferences" (op. cit. p665). In case this might be thought to point to an "evolutionary direction", it ought to be mentioned that there is evidence which would seem to contradict such a suggestion. Thus it was reported by Norman & Scott (1952, p188) that there are several studies which show that young children do not prefer green and blue. Rather they show a "preference for yellow and red, which gradually gives way to preference for blue and green in the later years at grade school" (the studies cited were Ellis 1900 & 1906; Gale 1933; Staples and Walton 1933).

These results may also be relevant to Wilson's speculation about the origin of the different arousal properties of green and red. According to him "green is placed 'safely' in the centre of the visible spectrum, while red and violet fall on its fringes and often occur in association with potentially dangerous wavelengths just outside it.

With green being evidently a popular, low arousal, colour there may obviously be important implications for the positive benefits that natural scenes appear to have. The influences on autonomic arousal and muscle tension may be related to their greenness and blueness. The same also apply to Positive Affect since green and blue are not only preferred colours, they are also experienced as "most pleasant" (Lewinski 1938). One of the four items that contribute to the Positive Affect factor of the ZIPERS scale is "feel elated or pleased" (Ulrich et al op. cit p222) and one could expect that a link would exist between the experience of pleasantness and feeling pleased.

If it were predominantly the colour of natural scenes which contribute to their pleasantness (or 'pleasingness') and thus to their ability to enhance Positive Affect, then this might also account, at least in part, for the fact that nature settings evidently hold people's attention. Research has shown that "positive emotional tone co-varied with sustained attention" (Wilson & Matheny, 1983 cited in Diener op. cit p561), although the connection does not, of course, follow with certainty. There do not seem to be any studies which have examined the attention holding properties of different colours.

The variable of attention plays a central role in the Kaplan's model of the restorative effect of nature. This will be discussed in more detail in the following section, but it is of interest to note in this context that within their model they attribute attentiveness to quite different characteristics of nature than its colours.

Of course the suggestion that the colour of natural scenes may help explain the effects seen above need not imply that these effects are reducible to the influence of one simple variable. In any case colour is, of course, "nearly always associated with some object" (Norman & Scott, op. cit p191). Separating the colour of an object such as a tree, for example, is somewhat artificial. Accepting this, it would nevertheless be desirable to further research the role that colour plays in the psychological and psychophysiological effects of nature on human beings.

It would have been interesting in this context if Ulrich had not excluded the 'leafless' months from his study on the recovery from surgery outlined above, although again colour would not have been the only variable which differed.

In Ulrich's studies the beneficial effects of nature settings on the subject's mood contrasted with the adverse effect of urban settings which increase Sadness. Ulrich did not discuss this finding. If colour is an important component in triggering emotional effects it would also be interesting to know what the influences on people's mood are of brown, grey and white.

### **Why are some urban scenes sad?**

Sadness is an emotion which is associated with loss. Changing from an interactional approach which aims to explain the phenomenon in terms of cause-effect relationships (i.e. colour viewing triggers specific states of arousal and emotion) to a transactional one, which is concerned with meaning (see Section 2.1 above), one may ask which kind of loss was signified by the urban scenes so that they elicited sadness.

A clue to the answer may come from a difference between the urban scenes of the first and second experiment, which increased Sadness, and the third which did not. The former depicted man-made structures only, while the latter showed people as well as the structures made by them. Thus there was 'life' present in the latter case, even though 'nature' was absent. It may, then, have been the absence or loss of 'life' in the urban scenes which induced sadness. If this could be corroborated (and it would be easy to develop an experiment to test its validity) this would raise interesting issues about the way that human beings are 'embedded in life' and also about the possible role of nature as a substitution for people in some circumstances, for example to counteract feelings of loneliness or perhaps bereavement.

It would be tempting to speculate about these and related issues even without the benefits of a factual base, but this would go beyond the scope of the present study. What can be safely stated is that the sadness effect of some urban settings ought to be studied further, since this might provide a deeper insight into people's relations with urban environments and give indications as to how the detrimental effects of them could be ameliorated. (It may follow that for many people urban existence is therefore made bearable by the contact with other living beings, and this implies that Ulrich's urban views devoid of people represent an artificial situation.)

### **Hull's studies on park visitor feelings**

Ulrich's experiments examined the short term effects of visual exposure to nature. A study which investigated people's emotional reactions to contact with nature in the form of a visit to a community park was undertaken by

Hull (1992). The mood of visitors to the park was assessed three times: upon arrival, 30 minutes after arrival and upon departure. The measurement instrument used was an adapted form of Thayer's Mood Activation Checklist (Thayer 1989) which consists of four factors: "energetic", "tired", "calm" and "anxious". Furthermore the participants were asked to identify 3 activities from a list of 12 which best characterised what they had been doing while in the park. The items on the list were weighted so as to provide an estimate about how active or passive respondents were in their leisure activities.

The visitors were found to stay on average for 90 minutes in the park (the range was 45 minutes to 3 hours); 35% came unaccompanied, 53% were with one other person and 12% came with two or more others. Their primary activities varied: 2.1% played a group game (e.g. volleyball), 15.5% threw a frisbee, jogged or bicycled; 16.5% walked; 34% sat and read, worked, thought watched or conversed with others; 30% sunbathed or slept.

The mood data were analysed in terms of change patterns (rather than change of the individual factors) combining a negative and a positive mood. The method used conceals, unfortunately, the information for the individual factors because it involved the addition of the amount of change in a positive mood to that in a negative mood.

Four positive mood changes were hypothesised to be possible: change from anxiety to calm, from anxiety to energy, from tiredness to calm and from tiredness to energy. The positive change patterns did not differ significantly from each other, but they did differ significantly for the two time periods examined (i.e. change from first to second measurement occasion versus the change from second to third measurement). While the mood changes which had occurred during the first thirty minutes had resulted in a positive level for the change patterns, those which occurred thereafter indicated negative mood states for three of the patterns (anxiety/energy, tiredness/calmness, tiredness/energy).

By combining a positive and a negative factor it is impossible to know what happened to the respective moods. For example, the fact that anxiety/energy changed positively during the first period and negatively during the second

could be due to changes in the level of energy, without anxiety having been affected at all. The same applies of course to the other patterns. In any case, what could be said, on the basis of the information provided, is that the participants experienced a positive mood change in the first thirty minutes of the park visit, although it is difficult to know what this change consisted of. At the end of their stay their mood had declined, although again it is unclear in exactly which manner.

A somewhat larger mood benefit occurred for the people who had engaged in "active" activities. However in all cases, though significant, the correlations involved were small suggesting that other variable besides activity must have contributed decisively to the mood changes which occurred.

Discussing his results Hull suggested that the positive changes in mood is due to be at least partly the result of the contact with nature. Underlining that these changes occurred after brief contact he proposed that "easy access to urban forests" will "allow people to take short breaks and ease their negative moods" (op. cit. p323 & 324). With regard to the lowering of the positive mood at the end of the park visit he stated that "this ... may result, in part, from people tiring after spending time out in the sun and/or expending energy through exercise" (ibid p323). Alternatively the decline in the visitor's mood may be attributed to the fact that they were about to leave the park which made them feel worse rather than the experiences they had had during the preceding period.

This interpretation would be supported by the results of a study by Hammitt (1981, cited by Knopf 1987 p. 807) "who tracked positive mood levels as people moved through five phases of interaction with a natural bog environment". The phases consisted of "anticipation", "travel to", "on-site visitation", "travel from" and "recollection at home". It was found that mood scores had increased steadily during the anticipation and on-site phases but they decreased substantially during the travel-from phase. However they increased again as the subjects were asked to reflect on their experiences several weeks later.

An analysis of the individual mood factors in Hull's study might have given some clue as to what process occurred towards the end of the park visit. If the moods which were affected were primarily tiredness and energy then it might be worthwhile to consider whether tiredness is necessarily a negative mood. There are at least two kinds of tiredness; one is a state which might be more appropriately labelled fatigue and which experienced more as an unpleasant depletion of energy (as might occur after prolonged unrewarding work) and the other is a positive state which is a pleasant feeling of release of excessive or pent-up energies (as might occur after physical exercise). One could speculate that brief contact with nature might alleviate the former and longer contact might increase the latter. No distinction was made between these by Hull which emphasises the importance of the selection of the relevant measures in such research.

Whatever the explanation for the decline in mood at the end of the park visit, it is of great interest that the positive mood changes occurred quite quickly. An assumption would need to be made to relate these changes to the experience of 'nature' in the park, but this seems reasonable considering that in another study "Passive Nature" was identified as the most prominent factor in terms of level of importance associated with park benefits (Ulrich & Addoms 1981, p51). If this relationship is accepted then the findings corroborate and extend that of Ulrich's third experiment where the mood benefits were observed within 5 to 7 minutes.

As was pointed out by both Ulrich and Hull, such rapid human responsiveness is particularly useful in an urban setting where contact with nature is limited and sporadic. It would suggest that smaller, dispersed, nature areas may be quite satisfactory from the point of view of the emotional benefits they may offer. It may be relevant in this context to remember that it has been found that people's preferences for nature areas are, in fact, not related to their size (c.f. Talbot, Bardwell & Kaplan, 1987 p. 56).

### **The effects of different types of landscape**

It is encouraging that there is evidence to suggest that even short term contact with nature in small areas can bring about positive changes in people's lives.

These benefits can also apparently be enhanced or diminished by the constituents of the nature areas. Thus in Ulrich's second experiment it was particularly water which had positive subjective emotional effects. Nature without water can also have differential effects on people's emotional reactions depending on the constituent parts, as was indicated by a study which examined the effects of tree and understorey vegetation density and the presence of paths (Hull & Harvey, 1989).

The subjects were two groups of thirty people in each, selected at random from neighbourhoods which differed in distance from city centre and housing density. A series of photos ostensibly depicting parks was presented to the subjects. These parks did not exist, but were 'composed' by the experimenters who selected nature scenes which showed the variables under consideration to a different degree.

All possible combinations of high, medium and low tree density and understorey vegetation with and without paths were used. The feeling of pleasure and the level of arousal were measured by a questionnaire adapted from Russel & Pratt (1980). The subjects were instructed to imagine that they were spending a free hour in the respective parks, and to indicate on an eight point scale for each of the items how well they described the feelings the parks would evoke. Besides assessing the parks with regard to their emotional reactions, the subjects were also asked to evaluate them for preference using an eight point scale.

On the basis of a factor analysis two of the items of the arousal scale, "alive" and "active" were excluded from the further data analyses because they loaded moderately on both pleasure and arousal. This did not fit the authors' "circumplex model of effect", according to which emotional responses can be described in terms of two fundamental dimensions - pleasure and arousal - which are purported to be independent. The association of "alive" and "active" would, though, seem to be an interesting finding in itself. The researchers reported that follow-up questions revealed that "alive" was interpreted by the subjects as a description of the park scenes rather than of their own state of feeling. (A problem with the experiment is that many of words used on the

pleasure scale do indeed seem to be descriptors of the setting rather than the emotions experienced, e.g. "beautiful", "pretty" etc.)

One might then deduce from the fact that it is linked with pleasure, that nature gives pleasure because it is seen to be alive. (This could have management implications for habitats where, for example, "dead" trees are being encouraged as part of the ecosystem dynamics.) With regard to "active" the researchers suggest that the "subjects may have interpreted it in regard to their expected recreational activities in the park" (Hull & Harvey, op. cit. p331). However it would seem to be possible that nature itself elicits an active feeling (independently of the activities which might be carried out in a natural setting) and this would then be closely linked with the pleasure it provides.

The data analysis revealed that the tree density was the most important of the three physical characteristics of the 'parks' in influencing pleasure. Increasing pleasure was observed with increasing tree density. A significant interaction effect indicated that outer neighbourhood subjects expected to experience a particularly low degree of pleasure in the parks with few trees. The density of the understorey vegetation was also related to pleasure, parks with little undergrowth being found to be significantly more pleasant than those with thick undergrowth by both neighbourhood groups.

The presence of a path interacted with the understorey vegetation in that a path considerably enhanced the pleasure that a park was expected to furnish when there was thick undergrowth, but decreased it when the undergrowth was thin. This was interpreted in terms of ease of wayfinding. A significant interaction of the three variables was found, which reflected an exception to the general rule that high tree density created the most pleasing parks; in a setting where tree and understorey density were at their maximum and there was no path most pleasure was expected. The authors point out that such a setting "resembles the classic European garden" (ibid p336).

Arousal was significantly influenced only by the density of the undergrowth. The two groups of subjects differed in their reactions, in that the subjects from the inner neighbourhood were more aroused by parks with more undergrowth than the outer neighbourhood subjects. This result was



interpreted in terms of lesser familiarity of inner city residents with natural parks, which therefore would be more "novel and of more interest to them" (ibid p337). An alternative explanation is that they may perhaps find these settings more anxiety-producing.

The relationships between the subjects emotional reactions to parks and their preferences were examined by regression analysis. Preference increased linearly with increasing pleasure and increasing arousal, pleasure being by far the most important predictor of preference. The finding that parks with arousal-inducing characteristics were preferred was unexpected by the researchers as they anticipated that "parks provide visitors with a relaxing emotional experience" which is "different from the arousing, hectic, eclectic built environment" (ibid p338). (Such simplistic assumptions about the 'qualities' which nature may exhibit seem common in much of this research.) Together pleasure and arousal explained 60% of the variance of preference which suggested to the authors that a person's preference for a park is highly dependent upon its emotional impact (ibid p339).

By demonstrating that a link exists between the physical characteristics of nature areas and the emotional benefits that people may derive from them, the above study underlines the fact that care needs to be taken over the design and management of "natural landscapes" wherever their aim is to maximise their psychological benefits or popular support as well as to provide a wildlife refuge. This is also indicated by an investigation which examined people's perceptions of personal safety in urban parks (Schroeder & Anderson, 1984).

Students were shown slides of parks differing in their physical characteristics from being densely wooded and largely undeveloped to open areas devoted to field sports. The sites also varied widely with regard to the facilities that they provided (e.g. picnic tables, paths etc.) and their surrounding features (e.g. visibility of streets and buildings etc.). Two experienced judges rated physical components of the scenes (e.g. tree density, average view distance, litter etc.). Also they allocated each scene to one of the following categories: a natural undeveloped site, a sports-orientated facility, a picnic site, a playground or a general purpose urban park. One group of subjects was asked to rate one set of slides according to how safe they would feel if they were

in the places pictured. A second group rated the scenic quality of the same set of slides. A third group of students were given a second set of slides which they had to rate first for safety, and then for scenic beauty. After this they were questioned about their ratings.

A factor analysis revealed that the subject's perceptions of the scenes were generally quite consistent although there was a "minority view" within each group. For most people security was associated with open mown areas and proximity to adjoining city streets. Low security was associated with undeveloped densely forested sites, and signs of abuse. The smaller group associated high security with densely forested areas alongside well maintained urban parks. Most people associated scenic beauty ratings with undeveloped densely forest sites and well maintained city parks with abundant trees and water. Low scenic beauty was associated with sports fields and visibility of many buildings, especially those with graffiti. The 'minority' factor favoured well maintained urban parks and associated low scenic quality with unmaintained natural areas, especially when litter was present.

Thus the majority of viewers seemed to expect to feel safer in developed open parks and less safe in densely wooded areas, while a minority held a roughly opposite view. For scenic beauty the relations were effectively reversed. Signs of abuse (e.g. litter, graffiti) decrease further the ratings for dislikes sites. Further analysis showed that visible amounts of woody vegetation and shrubs are negatively related to perceived safety, while grass and water, and especially view distance are positively linked with it, the latter being the strongest predictor of perceived security. Some man-made features (e.g. facilities, cars) enhance perceived safety while they are negatively related to scenic beauty.

With regard to the site categories it was found that natural undeveloped sites (which were mostly densely forested) received extremely low safety ratings but also the highest ratings for scenic beauty; sports fields were found to be safest but least beautiful. However overall the correlation between security and scenic quality was low, which suggests that there were settings which were high on both dimensions, others which were low on both and still others which were high on one and low on the other.

It is likely that a feeling of lack of safety would detract and interfere with the positive emotional effects of a nature setting. Therefore attention ought to be given to the features which are related to it in the design and management of such sites. The designers skill may be needed to provide instances where signs of human presence are provided in a way which does not detract from the aesthetic qualities and (probably harder) the 'naturalness' of such sites.

Of course one criticism of all visual preference studies based on slides or still images is that they can very poorly represent the true qualities of different areas which are experienced in person, e.g. the full bleakness and sterility of a windswept football pitch compared to the sense of life that can be obtained from natural landscapes. There are certainly other variables which may positively or negatively affect the pleasure people can derive from natural areas, and which ought to be taken into account in the site selection stage if possible.

It was found for example in a study on preference of outdoor areas (Anderson et al, 1983) that natural sounds (e.g. songbirds or crickets) added to the visual material enhanced the evaluation of heavily wooded natural areas and also on residential sites. Other sounds, especially mechanical ones (e.g. traffic, aeroplanes) had detracting effects. Moreover both enhancing and detracting sounds tended to have their strongest affects on the wooded site. The authors related this to people's expectations which will affect their appreciation and tolerance of noises, as well as the fact that some sounds are preferred to others (in all three studies carried out natural sounds were most preferred and mechanical ones least). Thus traffic noise may be expected to detract from pleasure experienced in natural areas, but the visibility of nearby streets may enhance perceived safety. Obviously it is not easy to reconcile these different trends on a site, even one which is purpose designed.

(Interestingly it is a generally accepted tenet of noise reduction in landscape design that hiding the source of the noise reduces its detrimental influence. The above findings would perhaps imply otherwise in that the noise becomes more 'alien' if divorced from its origins and that you also lose the benefits that come from street views.)

### **So what emotional benefits come from contact with nature?**

Collectively the above studies seem to suggest that people do respond emotionally to nature areas and providing that detracting influences are avoided the response is generally positive. It is not yet altogether clear what this positive response consists of but it would appear that feelings of pleasure and sustained attention or interest are a prominent part of it. Relaxed wakefulness may also occur, as may a diminution of negative emotions such as anxiety and anger. Furthermore fatigue may be dispelled, as will be reported in more detail in the following section. Fatigue has been conceptualised as a cognitive variable by most of those researchers interested in it in the nature context. However it is arguably more appropriate to consider it as primarily an emotional variable (see below). The effects of contact with nature on the feeling of fatigue awaits direct empirical evaluation. Further study is also indicated for all of the other emotional responses which may occur. So far the processes and patterns involved remain largely obscure.

One under-researched aspect of particular interest is that people prefer, and might seek out, nature areas which are arousing (see above). This would seem to suggest that the emphasis which has so far been placed on the relaxing, calming, stimulus-escape effects of nature may underestimate the range of responses and that people may be attracted to nature for more positive reasons (positive in the sense of widening the scope of their experiences rather than limiting or blocking it). Certainly such a model fits more closely with the way that children seem to respond to natural areas, which often manifest as a chance to play and actively interact within a complex setting that provides many different experiences.

It is of relevance in this context that a study which examined subjects' ratings for tranquillity and preference of natural environments (Herzog & Bosley, 1992) revealed that there are types of landscapes which are rated higher in preference than in tranquillity (rushing water) as well as vice versa (field-forest). Thus tranquillity is perhaps not the most preferred aspect of a natural landscape.

Furthermore it was found in another study (Getz et al, 1982) that coloured photographs of views which showed trees (a tree standing alone, a tree-lined residential street and a woodland) were rated as more calming and peaceful than a view of a treeless business district, but they were also regarded as more exhilarating and emotional (as well as more satisfying, interesting, beautiful, mysterious, pleasant, inviting, clean, private, poor and needy - ibid p262). The same has been reported for "wilderness experiences" where feeling alive and engaged with the world around has been identified as important psychological benefits (c.f. Kaplan & Talbot 1983, p181).

One could speculate that this combination of peaceful calm or even serenity and exhilaration which nature can evidently induce in human beings may be one of its main attractions. There would certainly not appear to be many "agents" which are capable of eliciting a similar combination of emotional experiences (music may be another, at least for some people).

It may be worthwhile to point out that nature's capacity to evoke exhilaration or delight appears to be intrinsic to it, and is not mediated by what ecological psychologists have called "affordances" (c.f. Gibson, 1979). Affordances are the functional or instrumental aspects of an environment, i.e. those characteristics which allow the animal or individual to use it in some way. In the Getz et al study cited above the view which received the highest rating for exhilaration was that of the single tree (its ratings for all of the other positive adjectives were also the highest with the exception of 'mysterious'; the woodland received the second highest ratings followed by the tree lined residential street). A single tree offers fewer affordances than a woodland and hence the aroused pleasant emotions are not primarily linked to instrumental value, although the latter may of course contribute to an overall reaction.

### **What about negative emotions?**

There is some suggestion that city dwellers may react negatively to contact with "natural" nature, especially to wildlife they have never seen before. Research into the emotional effects of nature ought to be extended to such issues. Studies to date have not paid any attention to individual differences in people's emotional reactions to nature. Furthermore, only one of them

(that by Ulrich with stressed subjects) has taken into consideration the possibility that nature's influence on people's mood may vary depending on the mood they are in in the first place. Many natural urban landscapes, being "left-over" sites, are situated in surroundings which are less than attractive (e.g. old industrial sectors). It would be of interest to investigate the emotional impact of such environments on visitors to the respective nature areas, and to examine whether it influences the emotional effects the latter have in themselves.

### **Conclusions**

The fact that people react evidently with pleasurable feelings to contact with nature has a direct bearing on the question of whether it enhances human well-being. It will be remembered that amongst the three types of definition of happiness or well-being were the effective ones, which stress pleasant emotional experience with a preponderance of positive over negative affect (see above). Since the evidence is that nature can enhance positive affect, and reduce some negative feelings, it would seem justified to conclude that it can indeed contribute to human well being.

#### **3.3.2 Cognitive effects**

People do not only react with their feelings to nature, they also respond with their thoughts or cognition. The researchers who are most closely associated with the cognitive responses to nature, or at least to natural landscapes, are the Kaplans. Their work has focused on landscape preferences and the factors which determine these.

It is arguable whether preference, i.e. liking and disliking, is a cognitive variable. According to Russel & Snodgrass (op. cit. p. 249) it is an affective appraisal, i.e. an attribution to a place, object, or event of an affective quality (e.g. likeable, repulsive, etc.). However this can occur without inner feelings on the part of the person who makes the appraisal. Therefore, it would seem to be justified to construe preference as a cognitive rather than an emotional response. The Kaplans themselves have certainly maintained that cognition is primary in landscape evaluation, although they do acknowledge that emotions

may also play a part (c.f. S. Kaplan, 1987, p.25). According to them "a considerable diversity of cognitive processes" is involved, not all of which are conscious (ibid., p.23).

The issue as to whether people respond to nature primarily with their emotions or their thoughts may have practical implications. For example, it is conceivable that nature and environmental education, in order to be effective, would have to take account of the ways with which people respond most spontaneously to the material presented. (For example there has been a call to focus more on the affective domain in environmental education with children, including the moral sphere (Iozzi, 1989b).) It is unlikely, though, that the debate about relationship between emotion and cognition in responses to nature will be settled in the near future, as a similar debate has engaged psychologists in other fields of inquiry for a very long time without having them brought to a final conclusion.

#### **The Kaplans' preference studies**

The distinction between emotion and cognition is, of course primarily conceptual and in human experience the two are closely intertwined. This is also evident in constructs such as mystery and fascination which are central to the Kaplans' cognitive model of landscape preference and the restorative effects of nature.

The Kaplans developed an evolutionary model on the basis of findings from studies on landscape evaluations. These showed consistently that natural scenes were preferred over scenes of the built environment (cf. S. Kaplan, 1987, p.7).

In an attempt to account for this preference four variables were examined; mystery, complexity, coherence and legibility. These were in turn conceived of in terms of two basic human functions: exploration and understanding. Exploration of an environment is invited by mystery, i.e. "the availability of information for further processing", and possibly by complexity (this variable was found in later studies to be of less relevance), wherein understanding is dependent on the coherence of the scene which is enhanced by its legibility

(ibid., p.10). Preference for landscapes which invite exploration and understanding, which is thought to be an attraction by information, is considered to be adaptive as it enhances the chances of survival (ibid., p.15). Exploration will lead to the acquisition of information about the surroundings, and understanding will help to interpret it quickly and assess its importance for survival. Natural environments are alleged to possess mystery and legibility to a high degree, which is the reason why they are preferred.

### **The restorative effect of nature**

There are quite a large number of studies on landscape preferences in which the Kaplans and their co-workers have tried to test their model. These need not be of concern here because they are not directly related to the issue of the relationship between human well-being and nature. For critical comments on the Kaplans' model see, for example, Parsons (op. cit. pp.5-6) and Ulrich et al. (op. cit. p.224). To these may be added that the studies give the impression of a certain circularity: Each time the researchers develop a hypothesis they promptly receive support for it from their data, which at times is analysed by what would appear to be rather idiosyncratic methods.) However, the Kaplans have extended their model to the conceptualization of restorative effects of nature, which is of direct relevance here.

According to the Kaplans, nature is restorative because it reduces mental fatigue through its capacity to hold people's involuntary attention. It is argued that there are two types of attention: one is "directed attention" and requires effort, while the other one - "involuntary attention" - is effortless (S. Kaplan, 1992, p.135). Mental fatigue is engendered by directed attention, since a person's capacity to make the required effort is finite. Modern society is alleged to draw excessively on people's capacity for effortful attention due to an information overload. Furthermore, with the quickening of the pace of life the opportunities for rest have declined. This results in a build-up of mental fatigue, which interferes with psychological functioning (ibid. pp. 135-136).

It is proposed that mental fatigue can be dissipated by involuntary attention. Involuntary attention is elicited by something interesting or exciting in the



environment. Nature is supposed to be such a source of interest and fascination, and as such is able to provide a restorative experience, especially since it encompasses also three further components which are necessary for such a restoration. These components are identified as "being away", "extent", and "compatibility". "Being away" refers to the distance, either physical or mental, from ordinary day-to-day routine. "Extent", which can also operate on either the physical or conceptual level, involves the feeling of spaciousness. "Compatibility" describes a situation of congruence or "fit" between the person and his/her environment. This is alleged to exist between human beings and nature in that "it is as if there were a special resonance between the natural setting and human inclinations" (*ibid.*, p. 139), and "functioning in a natural setting seems for many people to be less effortful than functioning in more "civilized" settings, even though their familiarity with the latter is far greater" (Kaplan & Kaplan, 1989, p.193).

The Kaplans' model of nature's restorative effects, then, is based on the assumption that people suffer from mental fatigue, which is distinguished from stress (*ibid.* p. 178), and that this can be alleviated by contact with nature. Their contention that all directed attention engenders fatigue can be questioned, as it has been found that task performance need not in fact produce fatigue as long as it is reinforced (*c.f.* Rohde 1983).

Whether or not fatigue is generated by the mechanisms which the Kaplans allege, and indeed whether or not it is as widespread as they imply (this would seem to be intuitively plausible but has actually not yet been studied empirically), there is no doubt that fatigue is an important variable. For example, it is evidently a central component of the prodromal state which precedes all the major psychiatric conditions. (Psychiatric disorders rarely appear suddenly. They are usually preceded by a prodromal state which is characterized by feelings of fatigue and "ennui", disquietude, and sadness. The prodromal state is seldom recognized by the sufferer or her/his family as abnormal. One could speculate that, if it could be dispelled, the development of the disorder could be aborted, which would obviously be a tremendous contribution to human well-being.

## Hartig's research into fatigue and restoration

The question as to whether contact with nature can dissipate fatigue was investigated, amongst other things, by Hartig et al. (1991) in two studies. In the first study the subjects were "experienced, physically fit backpackers" (op. cit., p.8). One group went on a wilderness backpack, one group went on a non-wilderness vacation, and another stayed at home and followed their normal daily routines. The measures were the ZIPERS, and the Overall Happiness Scale. This is an estimated scale which is presented as a thermometer ranging from 0 (not at all happy) to 100 (very happy) (Campbell, Converse & Rodgers, 1976). Furthermore a "behavioral measure of mental restoration" was used, which consisted of a proof-reading task.

There were three occasions of measurement: "before", "after", and "follow-up". The non-vacation subjects at the beginning and end of a four to seven day period (this equated the vacation time of the other two groups). Furthermore, all three groups completed the mood scales after a further 21 days. The proof-reading was carried out for obvious practical reasons only on the first and second occasions.

There were methodological problems in the analysis of the data which led to the authors drawing conclusions which cannot be supported. However the published data reveals that there was hardly any difference between the wilderness and the non-wilderness groups in the change which occurred from "before" to "follow-up" in their Overall Happiness scores (Hartig et al op. cit., p.13). The respective change for the non-vacation group, on the other hand, was only half as large. The change in Overall Happiness from "after" to "follow-up" of the wilderness group was double the size compared with that of the non-wilderness group, but this is only due to the fact that the former group had scored much lower at the end of their trip while this was not true for the latter group.

Thus what the data do indicate is that a vacation, whether in a wilderness setting or elsewhere, increases people's Overall Happiness. The fact that the wilderness group's scores had decreased at the end of their trip is open to several explanations - they may have been tired, or it may have been related

to the fact that the hike was over and they were about to go home. These subjects were tested in the wilderness area itself, while the non-wilderness group was tested in their homes. Having returned home might have allowed the latter to gain some distance and get over their unhappiness about having to go back to work.

The table of the data provided by Hartig et al. shows Overall Satisfaction scores as well as those on Overall Happiness, even though Overall Satisfaction was not described by them amongst their measurement instruments. (It is presumably a similar scale as that of Overall Happiness.) In this measure the change from "before" to "follow-up" is actually double the size for the wilderness group as it is for the other two groups. No standard deviations are given in the data table so that it is impossible to judge whether this difference might be statistically significant. If it were, this would have interesting implications for the question of nature experience and human well-being, since, together with the results on Overall Happiness, it may suggest that nature holidays could be unusually good at enhancing subjective well-being, whereas affective well-being is equally increased by other types of holidays (for the difference between subjective and affective well-being, see above).

As stated above, the ZIPERS system measures individual mood factors rather than overall states. No significant results were found. The measure which is of particular interest in the present context is that of proof-reading. The authors concluded that wilderness subjects improved in this measure, while the other two groups got worse. Although their own data analysis does not actually warrant this conclusion nevertheless the change scores indicate that the authors are in fact correct. The change for the wilderness group is a positive one, i.e. these subjects improved, while those for the other two groups are negative, i.e. they got worse. Once again it is not possible to judge the likelihood of statistical significance for this difference between the groups but the differential changes in performance are still quite striking.

Thus the wilderness subjects showed a larger degree of "mental restoration" than did the other two groups. The researchers adopted the measure of proof-reading because it had been used in a similar form in research on the after

effects of stress (ibid., p.10). According to them "attentional performance (is) known to be a sensitive index of mental fatigue" (ibid., p.21). Proof-reading is a vigilance task, and fatigue is likely to affect it. However, it will also be affected by other variables which influence sustained attention, such as habituation, level of interest, external distraction etc. Therefore it would seem that proof-reading provides only a very indirect measure of mental fatigue. Nevertheless it is of considerable interest that it would appear to have improved after a wilderness hike.

Attentional processes are involved in a wide array of human tasks so that a mechanism whereby people's level of attention can be improved is bound to have tremendous importance. The implications for human well-being would have to be studied empirically, but it is likely that better performance will lead, amongst other things, to subjective satisfaction and thus well-being.

In an attempt to elucidate the question of the restorative effects of nature further, Hartig et al. carried out a second study. The subjects were students, who were assigned to one of three conditions: going on a nature walk (in a park located near a major metropolitan area), walking in an urban setting (a mixed residential and commercial area near the centre of a large, culturally diverse city), or relaxation (which involved staying in a laboratory furnished with comfortable chairs, magazines, a radio and a reading lamp).

The dependent measures were again the ZIPERS and the Overall Happiness Scale, and proof-reading. Furthermore, psychophysiological measures were taken. These consisted of blood pressure and pulse, and skin conductance. Moreover a measure of perceived restorative quality was devised on the basis of the Kaplans' theoretical model. This consisted of a scale on which respondents indicated their sense of "being away", "fascination", "coherence/extent", and "compatibility" (ibid., p.12).

Recordings were taken before and after the induction of fatigue and subsequent restorative activity. The main analysis of the data was carried out on the post walk/relaxation scores "because the pre-test scores were equivalent throughout" (ibid., p.19). Once again this is inappropriate because the interest was in the eventual changes brought about by the experimental manipulation,

and it does not follow necessarily that a significant change has occurred when the significance is obtained for post score differences, but not for pre score differences, as was shown above. The analysis ought to have consisted of change scores of the measures given on the experimental day.

Another shortcoming of the data analysis is that the scores were compared across all the three subject groups only for the Perceived Restoration Scale. For the other measures paired comparisons were apparently carried out, and these seem to have contrasted the nature walk group with the other two groups taken together, although this is not quite clear. Combining the two non-nature groups would have increased the chances of finding significance.

The results for the Perceived Restoration Scale showed that the groups had differed significantly. The subjects who had been on the nature walk had scored highest, followed by the subjects who had walked through the built area, and then by the subjects who had remained in the laboratory. Thus, in accordance with the Kaplans' contention, the nature setting had been most effective in inducing a sense of "being away", "fascination", "coherence/extent" and "compatibility".

Furthermore, significant differences were found for two of the ZIPERS factors. The natural environment subjects had reported more Positive Affect and less Anger/Aggression than the other two groups. They had also felt more Overall Happiness, as the significance for these scores indicated. The ZIPERS results would seem to be broadly in agreement with, and perhaps extend Ulrich's findings. The fact that the nature walk group's Overall Happiness increased would appear to lend support to the suggestion made above that the wilderness subjects' lower scores at the end of the hike were not due to their experience of the natural setting but to other factors, such as having to leave it.

Proof-reading was also found to have differed significantly. Nature walk subject had done better than city walk, or relaxation subjects. In an attempt to "investigate the role of the restorative factors" further, correlations were calculated between a summary score of the Perceived Restoration Scale and the other measures (*ibid.*, p.23). A small but statistically significant

correlation was found between proof-reading and Perceived Restoration i.e. the higher the score which a setting received for the perceived restorativeness the better the subject's performance in proof-reading. This would seem to lend support to the Kaplans' notion that a setting's capacity to induce a sense of "being away", "fascination", "coherence/extent" and "compatibility" contributes to its restorative effects on attention paying and, accordingly, perhaps on mental fatigue, though the correlation was very small indeed.

The Perceived Restoration Scale was also significantly correlated with Overall Happiness and with ZIPERS scores of Positive Affect and Anger/Aggression (this correlation was a negative one). These correlations were actually larger than that with proof reading, but even they were relatively small. This may suggest that the perceived restorativeness of a setting is even more important for the beneficial emotional reactions it produces than for the improvement in the cognitive functions of attentiveness, although it has to be borne in mind that correlations do not, of course, indicate cause-effect relationships.

It would have been very interesting to know what the correlation was between proof-reading and Positive Affect but this was evidently not calculated. It was reported above that positive emotion and attention co-vary. Accordingly it might have been the increase in Positive Affect which was related to the improvement in proof-reading more than the perceived restorativeness. If this had been the case, it would have shown itself in that the correlation between proof-reading and Positive Affect would have been larger than that between proof-reading and Perceived Restoration.

It is regrettable that the authors did not use the opportunity they had to throw some light on the question of the relationship between exposure to nature, sustained attention and positive emotion. In any case their finding that people's attentional performance seems to be improved after nature contact is an important one, which may have practical implications for many areas of human functioning (e.g. school and work performance).

## The role of activity and re-inforcement in dispelling fatigue

The Kaplans' conceptualise fatigue as a cognitive variable, which results from an overexpenditure of directed attention (see above). However fatigue is complex and may comprise a motivational state of the organisms associated with a need for rest, a negative feeling tone and a decrement in a response following the prolonged or repeated exercise (Cofer & Appley, 1968, p135). With its motivational and feeling components, fatigue would appear to have a much closer affinity to emotions than to cognition. There is still no generally accepted definition of emotion, but it is recognised that it is "closely related to motivation" (ibid, p368). Emotions too are complex states and amongst their constituent parts subjectively the strongest is an action tendency (Arnold, et al 1971 p698). The same is true for fatigue which is characterised by a marked negative action tendency, i.e. the desire to stop performing or to refrain from starting it. It would seem that it is this aspect of fatigue which ought to be investigated in relation to its nature experience because of its profound implications for human functioning. (If the "motor" - i.e. the motivation - for functioning is removed it will cease or become disintegrated or require an inordinate effort.)

There is a study which may be of great relevance in this context. It was reported by S. Kaplan (1992 p139-141). but was carried out by Cimprich (1990). Few details of the research are given. The subjects were cancer patients who had undergone surgery. They were divided into two groups, an intervention and a control group. The intervention group selected four from a list of potential restorative activities. A contract was then drawn up which required the patients to participate in at least three of the activities per week, with a minimum duration of 20-30 minutes. Both the patients and the researcher signed the contract. "Out of the various restorative activities in the list, the predominant choice by far was of nature-related activities" (S. Kaplan, 1992, p141).

All of the subjects were tested four times over a period of 90 days with a "battery of attentional measures". At the first testing their performance was so poor as to fall into the range of brain-damaged patients. By the last testing the intervention group showed improvement on all measures. Their performance

gains on one of the tasks - the "Necker Cube" - was considered to be particularly striking as they occurred steadily throughout the test interval. The control subjects showed an erratic and uneven recovery, and many of their final scores were not significantly different from their initial scores (ibid p140). Other benefits of the intervention were that, compared with the control condition, more patients went back to work during the test period, and more of them returned to full-time employment. Furthermore, more of them started new projects such as slimming or learning a new language.

Kaplan interpreted these findings in terms of the variable of directed attention. However while attentional processes play an important role in many aspects of psychological functioning, it would clearly seem to overstretch the explanatory power of the variable to suggest "that activities essential to maintaining, or indeed recapturing one's quality of life are dependent on directed attention" (ibid p141). In any case, even if it is accepted that such activities depend on directed attention, this can only mean that they cannot be carried out successfully without such attention. The question though, is why they were carried out at all by one group and not by the other, i.e.. what made one group move itself - or motivate itself - to engage in activities such as going back to work or slimming, and not the other?

One can only speculate about the answer to this question, but it is likely that depression may have played a central role. It is well documented that many cancer patients suffer post-operatively from severe depression. Depression does not seem to have been measured in Cimprich's study. However it is of interest that at the first testing the patients performed so badly on the cognitive tests. One of the major areas of difficulty in neuropsychology is the differential diagnosis between depression and an organic impairment of the brain because depression can produce very similar performance deficits as damage, although they will only be transitory and will disappear with the depression. Thus one may perhaps infer from the cancer patients' cognitive tests that they were indeed depressed.

Reactive depression has been treated successfully with a technique involving the scheduling of pleasant activities (e.g. Lewinsohn & Libet 1972; Lewinsohn & Graf 1973; Lewinsohn 1975). Cimprich's intervention appears



to be practically indistinguishable from this procedure and it is therefore likely that it would have acted as an anti-depressive treatment. The intervention group's higher incidence of return to work and engagement in new projects would then be due to recovery from post-operative depression rather than due to a greater ability to exert directed attention. (Within this new interpretive framework the latter would be construed as secondary to the lifting of the depression, difficulties with concentration and attention being part of its usual symptomatology.)

With regard to the question of fatigue, which is of primary interest here, the mechanism whereby pleasant activities may act to improve depression is of importance. Pleasant activity schedules were devised as a vehicle to enable patients to receive "response-contingent positive reinforcement". It would go too far to explain the details here, as they are rather technical, but what is of relevance is that it has been found (Rohde, *op. cit.*, pp240-282) that response-contingent reinforcement does not only lift depressive mood in depressed patients but also prevents the development of fatigue as a result of task performance (see above). This applies to subjects whether they suffer from a neurotic disorder including depression or not. The fact that the cancer patients may have responded to the restorative activity intervention with an improvement of their depression would then suggest that the re-inforcer involved was the contact with nature.

This may have little meaning to the non-psychologist. However it is of great importance because if this were correct it would mean that whenever nature were "applied" response-contingently, i.e. whenever a person experienced nature consequent to an "action", it would have a direct effect on her/his fatigue quite independently from any other emotional or cognitive effects. This effect would consist of counteracting the generation of fatigue. This would have major implications for human functioning and also for affective well-being because without the build up of fatigue, which is a demotivator and has a negative emotional tone, the "balance" of a person's emotions may be kept on the positive side.

It has to be admitted that the proposed link between nature and fatigue is rather speculative. What would seem to be clear is that this is an area which

ought to be thoroughly investigated, even accepting that it will require considerable ingenuity to tease out empirically the various effects and their inter-relationships.

### **The role of fascination and cognitive freedom in restoration**

Within the context of the Kaplans' restorative model of nature, involuntary attention or fascination is alleged to have a restorative function in that it contributes to dissipating fatigue. Ulrich et al (op. cit p206) have pointed out that fascination is also elicited by feared "natural stimuli" such as snakes and spiders and that such experiences are "anything but restorative". It was presumably in response to this criticism that S. Kaplan introduced the concept of "self-fascination" (1992, p139). This is evoked by such objects as clouds, sunsets, snowpatterns etc. which "readily hold the attention, but in an undramatic fashion". This effortless attention is supposed to "leave ample opportunity to think about other things", so that "people can reflect about difficult matters that would be too confusing or too painful to contemplate under other circumstances". The latter would presumably be thought to contribute to the "healing" effects of nature, although Kaplan did not make this explicit.

The concept of "soft fascination" is an interesting one, although Kaplan's suggestion that it allows reflection about problems may appear to be counterintuitive. Fascination implies that a person's attention is completely captivated. Of course it is important not to allow poor choice of words to confuse concepts and it does not seem unreasonable that a person can be simultaneously focused and yet capable of reflection.

In "dramatic" fascination this process imposes itself upon the person without her/his will or consent (e.g. a person who suffers from a spider phobia is unable to ignore the presence of a spider, even if s/he wants to do so). However, in "soft" fascination this element of force or coercion is presumably absent and the person allows the object of her/his fascination to occupy her/his mind.

Adopting a term used by Hammitt in his study on the cognitive dimensions of wilderness solitude (1982), this mental state of "soft" fascination might have parallels with what is called "cognitive freedom". Hammitt administered a questionnaire describing various aspects of wilderness solitude to student wilderness campers. The most important factor rated by the students was "natural environment", which referred to a lack of man-made intrusions and noises in a completely natural environment providing tranquility and peace. (Of course few urban natural settings can come close to replicating this experience.) The second most important factor was "cognitive freedom". It referred to the freedom to limit one's attention to objects of one's own choice and the freedom to control one's thoughts and also one's actions and use of time. The third and fourth factors were "intimacy" and "individualism", referring to the opportunity to be with a small group of friends or relations without the intrusion of others, and being relieved from the rules and constraints of society and the expectations of others so that one can be oneself.

Thus cognitive freedom is evidently a very important aspect of a wilderness experience. One might speculate that it may also be experienced from contact with nature in urban areas. It is of interest in this context that one of the benefits which people have derived from participation in urban wildlife programmes was a "sense of freedom" (Mostyn, *op. cit.*, p.29). While this seems to have resulted primarily from the lack of behavioural constraints (e.g. "one's actions are not regulated or regimented", "people can walk where they like", *ibid* p.30) it is likely that the cognitive aspect would have emerged had the investigation addressed itself to it.

The Kaplans would certainly maintain that "soft" fascination of nature is not limited to wilderness settings. In her chapter on "the role of nature in the urban context", R. Kaplan mentioned amongst other aspects that nature can be "fulfilling and absorbing" (1983, p.148) and in her article on gardening she suggested that the fascination of nature, with its exclusive claim on the gardener's attention, will give her/him a rest from the worries of the day (1973, p.146). (The concept of "soft" fascination had not yet been invented at that time.)

It may be of interest in this context that people who suffer from states which are associated with heightened levels of fatigue, such as the neurotic conditions, evidence a restriction of cognitive freedom, with undesired repetitive or even obsessional thoughts being common.

Another reason why "self" fascination with nature and the cognitive freedom associated with it ought to be studied is that they may be processes which could be particularly vulnerable to disruption by other human beings, such as well-meaning conservationists or other teachers who like to interpret nature to their fellow human beings. The fact that cognitive freedom is evidently highly valued by people (see Hammitt's study reported above) would suggest that they might close themselves to messages from others. Accordingly sensitivity and respect for people's desire to choose themselves the objects of their attention and the contents of their contemplations in nature may be needed. How this restraint could be exercised without undermining the basic premise of interpretation and education is another area which awaits study.

It is possible that urban natural landscapes, because of their location, may be able to provide only limited experience of cognitive freedom compared with nature areas which are more remote. A powerful source of distraction from the "softly" fascinating stimuli of nature would seem to be noise, and this is likely to be considerable in many urban sites, especially those situated in industrial sectors of the city. Other intrusive pollutants such as dust or odour may also occur. People are quite intolerant of mechanical noises when they are in nature areas (see the results by Anderson et al. reported in section 3.3.1), and it may be that part of the reason for this is the partial or total loss of cognitive freedom which may result from such noises. It is likely that people differ in the importance they attribute to the experience of cognitive freedom in nature and their susceptibility to its disruption.

### **Self esteem and well being**

The importance which people evidently attribute to the cognitive freedom which nature provides raises the question as to whether it may be related to their well-being. The answer can only be speculative since no research exists into soft fascination and the only study on cognitive freedom appears to be

that by Hammitt cited above. A heightened sense of control, but not necessarily only cognitive control, is linked by Knopf (1987, p.787) on the basis of a perusal of the literature, with a heightened sense of competency and self-esteem. Various mechanisms may be involved in this, most of which involve the mediation of behaviour (they will be discussed in the following section). However, one which theoretically operate entirely in the cognitive sphere, is that the heightened sense of control may allow the person to discard "impressions that he or she is a victim of, or subjected to, the whims of the environmental milieu" (ibid). This fosters a sense of competency and with it emerges a sense of self-esteem.

High self-esteem was the variable which was most consistently and closely related to subjective well-being (see above). Accordingly, if it could be substantiated that contact with nature evokes cognitive freedom and that this engenders a heightened sense of self-esteem, this would be another mechanism whereby nature may enhance psychological well-being.

There are some studies on self-esteem and nature experience, although cognitive freedom was not itself studied. Thus, in an investigation into the effects of a challenging wilderness programme on students, self-esteem was measured (amongst other things) before and after the trip using the well-established Tennessee Self-Concept Scale (TSCS) and the Coopersmith Self-Esteem Inventory (SEI). Significant changes were found for the wilderness group whilst a control group showed no change (Gillett et al, 1991). Improved self-esteem after participation in outward bound challenge programmes was also reported by R. Kaplan (1974; 1977,a,b), although mainly less standardized measures of self-esteem were used in these studies. It is impossible to determine from this research whether the heightening in self-esteem was due to the participants' contact with nature or to the challenges they had overcome.

Therefore a further outward bound study is of interest. Here the subjects were not confronted with any extra challenges beyond having to live in, and find their way about, a wilderness (Kaplan & Talbot, op. cit). The participants were asked to keep journals of their daily experiences during the two weeks of their hike. A content analysis of the journals revealed that the subjects

developed fairly soon (by the fifth day) a new sense of self-confidence. This was linked with a greater sense of competence, though not control in the sense of domination of the environment. The authors attributed all the psychological benefits which the participants derived directly to the wilderness environment. According to them it is the wilderness itself which has the impact rather than other factors, although the mechanism is still open to investigation.

### **Feedback and self-image**

It is conceivable that there are other mechanisms besides that of cognitive freedom, whereby exposure to nature may influence people's self-esteem. For example it has been pointed out by several authors that nature is "largely devoid of negative feedback" (e.g. Knopf, 1987, p.787). This is quite different from most other situations, especially social ones, where feedback is a constant feature and negative feedback often occurs. The liberation from feedback would allow the person to make a judgement about her/him self which is based upon a personal evaluation rather than on external opinion, even if these opinions are objective and fair.

People's judgements of themselves are systematically biased towards a more positive self-image than is justified (c.f. Ernst, 1989). We tend to view ourselves through rose-tinted spectacles. It would appear that this tendency is adaptive, since it is disrupted in disordered conditions such as depression. (Depressed patients often assess themselves more realistically in social situations than "normal" subjects ....) However our self-illusion is highly responsive to feedback from reality, and people will sensitively adjust their evaluation of themselves in the light of direct feedback (c.f. Rohde, op. cit, pp.373-376 with regard to performance related self-evaluations). In the natural environment though, they can presumably indulge in their rosy view of themselves without such restraint and accordingly their self-esteem is likely to be high. In this case nature does not induce high self-esteem but it provides an ideal setting where people's tendency to maintain their personal worth on the highest possible level can exert itself.

"Feedback" appears to be used by the respective authors in a rather loose manner, which would require clarification. It may be that what is meant by an absence of negative feedback is that people do not feel rejected by nature. This would presume an anthropomorphic or personalised perception of nature which is actually quite common. Moreover, it would seem that in specific instances nature provides quite clear negative feedback to people if only they were able and/or willing to understand it (e.g. soil erosion as a result of over exploitation of the vegetative cover, etc.). Similarly some elements of nature can behave in ways which can be interpreted negatively, e.g. animals fleeing as humans approach. It may be that urban nature, almost by definition more tolerant of human presence, can offer a different order of experience to people than rural wildlife.

### **Oneness with nature**

The fact that nature is essentially unresponsive to people and does not provide negative feedback has been linked by Wohlwill (1983, pp.24-25) to quite a different factor. According to him, the absence of a reaction to, and an acknowledgement of, the person by nature leads to a blurring of the boundaries between her/him self and the environment. This engenders a feeling of freedom and oneness with nature, although in some it could also provoke discomfort and anxiety (these would be individuals who are highly dependent upon signs of responsiveness from their environment).

There do not seem to be any scientific studies which have investigated this phenomenon of a sense of oneness with nature, although it is a very old theme and has surfaced at various times in history (see above). In an attempt to link it with what is known about well-being parallels can be drawn with love, which is known to influence well being (see above). Love is no doubt as complicated and complex a phenomenon as is the sense of unity with nature, but central to both would seem to be a symbiotic fusion with an "other". One could speculate that it is this aspect of the experience of love which is importantly linked with subjective well-being. (It would be inappropriate to try and justify this speculation here but a possible basis for it could be the existential philosopher's ideas about human beings having been "thrown" into the world and the resulting dread they feel such as will be seen

in various works by Kierkegaard and Heidegger). Since this aspect is shared by the experience of oneness with nature one could perhaps deduce that the latter too will be linked with subjective well-being.

### **Transcendental experiences**

The experience of wilderness is not only alleged to induce a sense of oneness with nature, but also with the universe (c.f. Scherl, 1990 cited by Prigram, op. cit, p.147). This points presumably towards a transcendental experience. Again there do not seem to be any studies which have investigated either the mechanisms whereby this experience is brought about, or its phenomenology.

The sense of oneness with nature and the universe is supposed to be particularly strong, or likely to emerge, in the wilderness. To a certain extent it may be possible that wild nature in towns could have similar effects, as these are phenomena which would appear to be related to the character or essence of nature rather than its locality or extent. However it may be the case that the duration of the contact, or at least the duration of the absence of other intrusions, may play a key role in encouraging this experience. Such experiences ought to be studied empirically, not only because this would throw light on the question of the significance for well-being but also because it might deepen our understanding of the fundamental relationship between human beings and nature.

One aspect of the experience of oneness with nature is clearly that nature takes on a symbolic meaning. Nature has been invested with a host of symbolic attributes by humans. This applies both to its parts (e.g. for the symbolism of some animals c.f. Kellert, 1983, pp. 260-262, and for the symbolism of some flowers c.f. Shoemaker et al, 1992) and to its entirety (c.f. Knopf, 1987, p.788). Nature symbolism may enhance human well-being in many ways besides fostering a "loving" or symbiotic extension of the self, and this ought to be studied. One possibility has already been mentioned in connection with Antonovsky's salutogenic health model (see above). There it was suggested that nature may enhance a person's sense of coherence and thus contribute to maintaining her/him on the health end of the continuum of physical well-being. (It may be worth pointing out that the sense of coherence



as perceived by Antonovsky differs from the Kaplans' concept of the same name in that it not only refers to legibility and predictability but also to a trust in relatively positive outcomes - see above.)

Symbolic meanings of nature which could act in this way could include concept of nature as a symbol of life itself with its basic vitality and capacity for growth and spontaneous change (c.f. Wohlwill, 1983, p.22). There are also concepts that nature is inherently good (Blomberg, 1982 cited in Knopf, 1987) and continuing and enduring (Scheffer, 1977 cited in Knopf, 1987).

### **Conclusions**

Summarising the issues discussed in this section, it is evident that contact with nature may positively influence human well-being on, or through, the cognitive level in a number of ways. Thus there is evidence to suggest that exposure to nature may improve voluntary attention. This could no doubt have a positive effect on many other cognitive functions. Some of these are bound to affect well-being, but even this has not yet been studied in any detail (so far only intelligence as a whole has evidently been related to well-being, and this was not found to be consistently linked with it - see above). Therefore the attentional consequences of nature exposure are likely to be beneficial.

Whether or not nature's influence on attention also dissipates mental fatigue remains an open question. In any case it is possible that nature contact may have a direct effect on fatigue that is independent of this. Exposure to nature may prevent fatigue from building up as a result of behaviour. This would have important implications for human well-being, as mentioned above. However, much more research is needed before any conclusions can be drawn about the mechanisms involved. The studies which have been carried out so far have really done no more than indicated that this is a worthwhile area of research.

Nature may positively affect people's conception of themselves. Here again the mechanisms involved are still to be elucidated. The variables of cognitive freedom and lack of negative feedback may not be the only ones which are relevant. This relationship might be illuminated more effectively if an

interactional approach is complimented by a transactional one (see above) although this is not to suggest that "meaning" variables, such as self-evaluation, are impervious to a natural science approach. A transactional approach would seem to be particularly appropriate to the investigation of the relationship between the symbolic character of nature and human well-being, although an interactional approach may also contribute useful information.

Research linking nature symbolism with psychological well-being has evidently not even begun yet. (This applies also to symbolic interpretations of natural landscapes such as the concepts of prospect and refuge offered by Appleton (e.g. 1975). These constructs may have direct implications for psychological well-being. References to an alleged connection between natural symbolism and well-being are not infrequent in conservation literature.

Thus there is ample need for research into the relationships which may exist between contact with nature and cognitive psychological benefits, especially considering that the variables which are discussed here are unlikely to be the only ones of relevance. As in the case of emotions, direct research into the cognitive aspects of nature's influence is in its very earliest stages. However the evidence so far is certainly encouraging even if the details remain unclear.

### **3.3.3 Behavioural effects**

The preceding discussion has shown that the cognitive benefits which people may derive from contact with nature are of two kinds: firstly their cognitive functioning may be improved (e.g. through better attention or less fatigue) and secondly favourable cognitive contents may arise (e.g. a high self concept and a sense of a symbiotic expansion of the self). In the first case the nature experience acts directly on the person's thinking processes, whilst in the second it sets the occasion for the emergence of positive thoughts. A similar distinction can be made with regard to the benefits which contact with nature may have on people's behaviour. On the one hand exposure to nature may exert a direct influence on the behaviour in which a person engages, and on the other it may provide a setting which encourages constructive behaviours which enhance the person's psychological well-being.

In fact three types of behaviour can be distinguished: behaviour which is elicited by nature and which is engaged with it, behaviour which nature evokes but does not involve it, and behaviour which takes place in a natural setting but is neither triggered by nature, nor is it engaged with it.

### **Nature-engaged behaviours**

#### *Exploratory behaviour*

A type of behaviour which has been linked in the literature with nature contact is exploratory behaviour. Thus it has been alleged that "nature offers... a shift in the stimulus field, inherently pleasing to an organism fuelled by the need to investigate" (Knopf, 1987 p 786). The concept of human beings as "exploratory animals" is of relatively recent origin, dating back to the 1950's (c.f. Cofer & Appley, op. cit p277). For the previous hundred years or so, psychologists had construed humans as being driven primarily by internal drive states. However as a result of research into exploratory and manipulatory behaviour, it became accepted that "external stimuli... probably have the capacity in themselves, as long as they have certain characteristics, to arouse behaviour" (ibid, p301).

The researchers who have pointed perhaps most consistently at the ability of natural landscapes to arouse exploration are the Kaplans and their co-workers. The characteristic which they have linked with this is "mystery". The concept of "mystery" refers to the attribute of a landscape to hold "a promise of further information". This invites inference and a sense of exploration (Kaplan & Kaplan op. cit, p56). The Kaplans demonstrated that "mystery" is a predictor variable for landscape preference, i.e. that landscapes which possess this characteristic are preferred. These tend to be natural landscapes rather than built ones. However, what they do not seem to have studied is whether "mystery" is in fact linked with exploratory behaviour.

The Kaplans' research methodology involves the use of simulated landscapes (i.e. photographic representations) and it would therefore not have been possible for them to investigate exploratory behaviours. They could have examined whether landscape scenes rated high in mystery triggered visual

exploration, for example in the form of prolonged scanning. This would not only have provided some external validation of their "mystery" construct, but would also have furnished interesting information on people's behavioural responses to natural scenes.

The question as to whether nature, or some of its parts, does elicit exploratory behaviour was taken up in a study on park visitors response to wildlife (Dick & Hendee, 1986). The subjects were observed as they passed through seven study sites in five urban and suburban parks. The observations were followed, for some of the subjects, by brief interviews which included questions about the purpose of the park visit, familiarity with the site and responses to the wildlife.

Categories of observation were the subject's principal activity (e.g. jogging, walking), the physical characteristic and behaviour of the wildlife (e.g. number of species present, their activity), the social features of the setting (e.g. presence of other people and their responses to the wildlife), and the physical attributes of the environment in and around the site. The subjects showed three types of exploratory behaviour in response to the presence of wildlife and these were recorded. They were an "orienting response" which consisted of slight muscular and postural adjustments, such as head turning or neck stretching; an "investigating response" which involved gross adjustments in the subject's postural behaviour such as stopping, changing direction or changing the principal activity to see the wildlife better; and a "contacting response" which was a deliberate attempt to make contact with or find the wildlife.

The results showed that 55% of the subjects made an observable response to the wildlife. Of these responses 74% were orienting responses, 20% were investigating responses and 6% sought deliberate contact with the wildlife. The vast majority of subjects (94%) who responded to the wildlife were engaged in activities unrelated to the presence of the wildlife at the time. According to the authors this is consistent with other studies, where it was found that for most people wildlife observation is casual and incidental to other activities. Females were significantly more likely than males to change from a principal activity to interacting with the wildlife.

Factors which contributed to drawing the subject's attention to the wildlife were the number of animals as well as the number of species and their behaviour. Active or vocal animals elicited more responses than did inactive or quiet ones. The subject's principal activity exerted an influence in that the more physical effort and mental involvement they require, the less frequent was the observable response to the wildlife. Furthermore the frequency of response to the wildlife varied with the number of people in the subject's company. It increased steadily from one to four persons but levelled off when the group was larger. There was a powerful social effect in that when one member of the group paid attention to the wildlife the subject was likely to follow the example, but there was an equal effect when a member of the group would not attend to the wildlife. The number of bystanders did not influence the subject's reactions, except when it increased to above ten at which stage the response to the animals decreased.

The interviews revealed that only 3% of the subjects had come to the parks specifically for wildlife related activities. Of the subjects who had made observable responses to the wildlife 85% said that they had been attracted by the movement and sound, and only 2% said that the colour had drawn their attention. Familiarity with the site was associated with responsiveness to the wildlife in that newcomers tended to make more orientating responses while those who knew the site better made more investigatory responses. Those who were very familiar with the site made less investigatory and more orienting responses. Of the subjects who reported having had contact with wildlife, 92% said that this had enhanced their visit to the park. The comments made in this respect indicated apparently mainly pleasure (few examples are given by the authors).

Thus it is evident that wildlife can evoke exploratory responses in many people, even when they are engaged in different behaviour and have little intention to attend to it. The characteristics which were responsible for inducing this behaviour were movement and sound in this case, but it is conceivable that under different circumstances other features may be equally important. The type of behaviour which was triggered, i.e. engagement with wildlife, was apparently experienced as pleasurable by the people concerned.

As such it would have contributed to their effective well-being, since this is a state where positive emotions are pre-eminent.

There do not seem to be any studies which have investigated aspects other than animals such as different types of vegetation. Such studies would be desirable, especially since the enticement to explore is frequently mentioned as one of the benefits of natural landscapes, particularly in urban areas and for children (c.f. Baines 1985). In such statements there is the implicit assumption that exploratory behaviour is favourable for psychological well-being. This assumption would seem to be justified, since exploration increases stimulation and research has indicated that "stimulation is a state which organisms seek and which will reward them" (Cofer & Appley op. cit p285) depending on certain conditions. Furthermore, as was found in the wildlife study reported above, specific exploratory behaviour may have its own pleasure which would then combine with the reward value of the exploration.

#### *Adventurous behaviour*

Adventurous behaviour is another type of response which nature can trigger. Adventurous behaviour, which may involve exploration, would seem to differ principally from the latter in that it involves a challenge to the person's skills and furthermore it has an element of risk. Adventurous behaviour in nature settings tends to be associated with children's play, but it is of course by no means limited to this. Climbing a tree or crossing a river on stepping stones are of course adventurous activities, but it is important to distinguish the occasions when such activities are carried out by necessity (and the natural setting merely sets the occasion for them) from the situations where these activities are inspired by the setting.

Why and how nature may trigger adventurous behaviour in human beings are intriguing questions, but there do not appear to be any investigations which have addressed these. What are the "stimulus characteristics" of natural settings which elicit such behaviour, or in other words why is it so irresistible to try to cross a river if there are boulders lying in it? Furthermore which people find it irresistible, what are their characteristics and under what circumstances do they feel the urge to cross the river and when do they give

in to this urge? As was found in the study on the reactions to wildlife, it is unlikely that everybody would respond to the trigger which nature provides for adventurous behaviour. A scientific exploration of these issues would not only furnish information which would be in the management of natural areas, but it would also give a deep insight into the relationships which exist between nature and human beings.

(Psychoevolutionary theories such as that put forward by Appleton (1975) would no doubt construe human exploratory and adventurous behaviour in response to nature cues as biologically and genetically determined. The urge to climb a tree would be interpreted as resulting from a need to gain "prospect" and the boulders in the river would constitute a symbol of "hazard". However these constructs are so broad as to be applicable to almost any landscape feature and so provide little illumination of the specific "stimulus characteristics" which trigger behaviour. Furthermore their explanation as behavioural stimuli in terms of survival value can be practically extended to almost any environment - behaviour interaction. In this respect psychoevolutionary theories of responses to landscapes rather resemble psychoanalyses with its construct of the unconscious, which is equally unspecific and all-encompassing as an exploratory mechanism, and does not lend itself to empirical examination either. The apparent ease with which these theories provide an explanation for almost any phenomenon by virtue of their generality may be part of their appeal.)

Adventurous behaviour can theoretically readily be linked with human well-being. It will be remembered that one of the most important determinants of subjective well-being is self esteem. People's self-evaluation is essentially based on their interactions with their environment (Coopersmith 1967, p20). Positive feedback from these interactions will enhance self-esteem. Adventurous behaviour which is triggered in natural settings is under the control of the person who engages in it (i.e. s/he decides her/himself which challenge or risk to set for her/himself. Accordingly s/he can match the challenge and risk with her/his ability to meet them, which means that it is likely that the respective behaviour will be successful and this will raise her/his self-esteem.

The adventurous behaviours elicited by nature have at least three ingredients which would contribute to increasing self-esteem; they are self-controlled, they stretch the person in the application of her/his skills, and they are likely to have successful outcomes. Natural landscapes are, of course, not the only settings which can provide the conditions for behaviours which have these characteristics, but they can do so for practically anybody, regardless of background, which is not true for many other settings.

Research into the relationships between adventurous behaviour in a natural environment and self esteem has been carried out in the context of outward bound programmes. However there the adventurous behaviour was neither elicited solely by nature nor was it entirely under the control of the participants (except that they could presumably pull out at various points) as the tasks were set by the programme organisers. In any case, as was reported above, such programmes have been found to increase self-esteem. It would be of interest to examine whether nature-elicited self-set adventurous behaviour has different effects on people's self-evaluations than nature-related challenging tasks set by other people. Amongst other things this would provide information on the importance of control, which has also been discussed in relation to other than adventurous behaviour in nature settings, as will be mentioned below.

### **Nature-evoked behaviours**

#### *Positive behavioural change*

Besides eliciting behaviour which engages the person with the natural phenomenon which acts as a trigger, it is conceivable that nature may also evoke behaviour which involves no such engagement. This is suggested by a study into the effects of flowering pot plants on the behaviour of patients who suffered from a long-term psychiatric illness, mostly schizophrenia (Talbot et al, 1976). The patients were observed in the dining room of their hospital. Yellow chrysanthemum plants were placed on each of the dining tables and five types of behaviour were recorded: speech, social gazings, seating location, time spent in the dining room and quantity of food consumed. The results showed that the introduction of pot plants produced a significant



increase in speech but this was transient and occurred only during the first week. However a lasting effect was observed on the time that the patients spent in the dining room as well as for the food consumed - both increased significantly.

One of the common symptoms of patients suffering from chronic schizophrenia is social withdrawal. Accordingly the fact that the patients spent more time in a social environment was regarded as of considerable importance by the researchers. Moreover the effect occurred very rapidly, being evident already in the first week in which the plants were introduced. The authors pointed out that their data "shed no light on the mechanism by which flowers exert their effects on mental patients" (ibid, p.366). It was their impression that the staff was also affected, evincing positive feelings and heightened morale.

The question of the mechanism whereby the plants influenced the patients' behaviour is of great interest and would merit further investigation. It is possible that they might have had a direct effect, inducing the patients to stay longer in the dining room, rather like the animals were found to have a direct effect on the park visitors in drawing their attention to them (see above). Alternatively, the patients might not have been affected by the presence of the plants at all but might simply have responded to the different atmosphere in the dining room which would presumably have resulted from the staff's improved morale.

There are many possible relationships between the variables which were examined in the study and only further investigation could reveal which mechanisms were operating. What is of interest in this context is that the results suggest the possibility that exposure to nature - in this case to flowering pot plants - may actually elicit behaviour which is external to it in the sense that it does not engage the person with the respective natural phenomenon.

Not knowing how the patients in the study on the effects on pot plants spent their additional time in the dining room, one could speculate that they just "hung about" longer. Loitering is a behaviour which intuitively is quite likely

to be elicited by a natural setting. Therefore it is surprising that in a study in which users of three natural urban areas were observed, and loitering was evidently one of the behavioural categories recorded, it was hardly witnessed, except for 1% of male visitors of one area on a Sunday (Millward & Mostyn, *op. cit.*).

Loitering may be difficult to observe in a non-structured setting such as a nature area (as opposed to a more structured one such as a dining room) because it is really a "non-behaviour" which may be more readily identified by the person's state of mind than her/his overt behaviour. Alternatively nature may in fact not evoke loitering, or people in today's achievement-amusement-orientated society may have forgotten how to respond to cues for loitering. Whether loitering is related to psychological well-being would still remain a question for investigation although intentional loitering, i.e. that which is under one's control rather than being imposed by the lack of opportunities for other behaviours, is a pleasurable state and thus can be expected to enhance affective well-being.

There may be other "nature-neutral" behaviours which contact with nature, or its component parts, may elicit besides loitering. An investigation into such behaviours would seem to be desirable since it would contribute to a more complete assessment of the functions which natural landscapes can perform for urban residents. For example, based on the results of a study into altruistic behaviour, it would be reasonable to hypothesize that people may be more inclined to help others when in contact with nature. The experiment was carried out in a built area before and after the construction of a shopping mall (Amato, 1981). The prosocial behaviour consisted of helping the experimenter to pick up pencils which he had "accidentally" dropped. After conversion of the street into a shopping mall there was a significant increase in the proportion of people who stopped to help. In an attempt to determine the factors which might have been responsible for bringing about the change in people's willingness to help, ratings of pleasantness were obtained for slides depicting the street prior to conversion and for slides of the shopping mall. The latter were rated as more pleasant which suggested that people's mood might have been more positive in the shopping mall than in the street. Their

helpfulness might then have been a correlate of their more pleasant mood state.

It will be remembered that contact with nature was found to induce an increase in pleasant affect (see above). Accordingly, if it is correct that it was their positive mood state which prompted more people to give help in the shopping mall, one would expect the same to happen in nature areas.

There do not seem to be any investigations which have studied altruistic behaviour in relation to psychological well-being. However people's general well-being was found to be importantly linked to the way in which they are treated and accepted by other people (see above). Prosocial behaviour is likely to elicit positive responses from the others at whom it is directed. Accordingly it would most probably contribute not only to the well-being of the recipient but also to that of the person who engages in the altruistic act.

It is of course entirely speculative that nature contact might induce prosocial behaviour but it is of interest to note that one of the results of the participation in an outward bound wilderness programme was that the youngsters developed apparently a greater concern for other people (besides a greater acceptance of themselves; c.f. Kaplan, 1974).

#### *Undesirable behaviours*

On the other hand there seems to be little doubt that nature exposure may also elicit anti-social behaviour, although there do not seem to be any systematic studies into this type of behaviour either. Some anti-social behaviour such as vandalism appear to be elicited by parts of nature directly without the mediation of mood induction. (This is of course not to say that the vandal may not be in a specific mood state at the time s/he carries out the destructive act, but only that nature may not have induced it.) Thus the fact that standard trees, for example, are apparently "favoured" targets of vandalism would seem to suggest that some natural phenomena have "stimulus characteristics" which are particularly potent in triggering the respective unhelpful responses.

It would be as interesting and useful from the point of view of design and management of natural areas to study systematically the nature features which evoke destructive behaviours, as it would be to study those which elicit constructive responses. With regard to the question of psychological well-being, it can probably be assumed that the vandal derives pleasure from her/his behaviour and that it thus increases her/his affective well-being. This points perhaps at the fact that the enhancement of individual affective or even subjective well-being is not quite as uncontroversial a criterion for the assessment of the value of a natural landscape as might at first appear.

While nature vandalism engages the person with the natural phenomenon, other anti-social behaviours may occur in natural areas which are "nature-neutral" in the sense described above, i.e. which do not involve the person with any aspect of nature. The constructive "nature-neutral" behaviours mentioned above (loitering and helping) are "nature-related" though, in that they are thought to be induced by nature - perhaps through the mediation of a positive mood state or even directly. No example of a "nature-neutral" anti-social behaviour comes to mind which is also "nature-related".

If it is true that all the "nature-neutral" anti-social behaviours which are committed in nature areas are unrelated to nature, then natural areas merely provide a setting for them (e.g. mugging, sexual assault, murder etc.). This distinction is important because the anticipatory fear which these behaviours evoke is apparently often transferred to the natural features which might provide a setting for them with the result that they are disliked (c.f. Talbot & Kaplan, 1987). Clarity about the distinction between a nature area as an eliciting agent and as a setting might help to channel the fear into a more realistic appraisal of risk and away from an overinclusion of its objects, although it does of course nothing to resolve the practical problem of preventing the misuse of natural landscapes as settings for anti-social nature-unrelated behaviours.

In fact there do not seem to be any studies which have investigated whether natural areas might be more than just settings for such anti-social behaviours, i.e. whether they might actually contribute to triggering it. It remains though another issue for empirical investigation.)