

The need for a theoretical grounding of the human-animal relationship is addressed from the perspective of the motivational bases of attitudes toward animals. Building on recent developments in attitude theory, and integrating themes from the historical and cultural background to Western attitudes, a model is developed that proposes three fundamental motivational bases, where responses to animals depend on instrumental self interest, empathy/identification, or people's beliefs and values about the nature and status of animals. Initial empirical studies using the model revealed reduced instrumentality, heightened empathy, and strong commitment to a value perspective endorsing equal status for humans and animals among animal rights supporters. Farmers exhibited an opposite pattern, and supported the dominant status of humans. The urban public evidenced moderate levels of instrumentality and empathy, and a neutral value position with some individuals exhibiting considerable ambivalence (agreeing with both equality and dominance). Gender differences on instrumentality (favoring males) and empathy (favoring females), were less evident for values, and were confined to female and male farmers. Directions for future research are discussed, as is the practical value of this approach.

Empirical studies on the human-animal relationship tend to be fragmented, according to the focus of different disciplines, each of which emphasizes specific practical issues. This has resulted in an abundance of descriptive information, but a lack of a theoretical infrastructure with which to organize, explain, and understand empirical results so they can be more effectively utilized (see Kellert, 1983; Kidd & Kidd, 1987a, 1987b).

In developing such an infrastructure one is confronted with the complexity of the area. However, examination of the historical and cultural origins of Western attitudes toward animals suggests the presence of three fundamental motivational forces, which may well provide a foundation for understanding the human-animal relationship. It is clear from the accounts of a number of writers (e.g., Carson, 1972; Clark, 1977; Turner, 1964) that attitudes have depended partly on people's experience of animals. The instrumentality or usefulness of animals has tended to be the dominant concern in this regard.

At the same time there have been some people throughout history whose experience of animals has entailed greater awareness of, attention to, and sympathy for the animals' point of view (e.g., Plutarch, 1976; More 1518/1964, pp. 97-98; Voltaire, 1976). This experience of what might best be termed *empathy* or *identification* tends to be associated with a caring attitude towards animals and concern for their well-being. It has been suggested as the basis of genuine morality (Darwin, 1877/1989; Hume 1739-40/1972, 1777/1963; see also Callicott, 1986; Hoffman, 1987; Naess, 1984).

Overlaying these two aspects of the experiential base (instrumentality and empathy), and exerting a profound influence over attitudes and behavior, have been people's theories, beliefs, and values about the nature and status of animals in the scheme of things. Such theories have been heavily influenced by the prevailing religious view, and the ideas and dictates of

theologians, scholars, and philosophers. For example, St. Thomas Aquinas (1976a, 1976b) was influential in presenting animals as existing only to serve human purposes.

In contrast, the animal rights and animal liberation philosophies (see Singer, 1975; Regan, 1983; Rollin, 1981; Salt, 1892/1980) endorse a principle of equality where animals are viewed as having intrinsic value (as opposed to mere instrumental value for humans), and an equal basic right to respectful treatment on account of that intrinsic value.

In a recent study, Hills (1991) demonstrated that these three motivational bases (instrumentality, empathy/identification, values and beliefs) are echoed in a number of different areas. For example, they feature in the debate about the basis of ethics and morality that impacts greatly upon our relationship with animals. They also appear in the environmentalist literature. Petulla (1980) (see also Rodman, 1983) identified three relatively distinct streams of thought that have evolved within environmentalism: the economic (or instrumental) perspective; the biocentric perspective that involves an intuitive, experiential, identification with the natural world; and the ecological perspective that involves a commitment "to a model of scientific understanding of how nature orders itself" (Petulla, 1980, p. 26).

The presence of these fundamental influences has also been implied in several empirical studies. For example, Kellert (1980) speculated that there appear to be "two broad and conflicting perspectives of animals and nature . . . [that] may suggest a dynamic basis for the considerable conflict existing today regarding various interactions between people and animals" (Kellert, 1980, p. 116). His two broad perspectives related to an instrumental-ethical distinction, but also highlighted the necessity of taking into account the emotional dimension of empathy and love for animals.

In the area of animal experimentation, Arluke (1988) proposed a fundamental division between identification with animals on the one hand, and objectification of them (under the influence of instrumental demands) on the other. Rowan (1989a, 1989b) suggested that this "pet/object dichotomy could be used as a theoretical basis to explore many aspects of human-animal interactions" (Rowan, 1989b, p. 73). While this dichotomy acknowledges the importance of empathic identification and the instrumental demands of the situation, it does not do justice to the role of the third factor, that is, the ideology, world-view, or beliefs and values that participants hold about the nature and status of animals in the situation (see Rollin, 1989, p. 88, for reference to the role of scientific ideology in this context).

Developments in Attitude Theory

Having approached a theoretical grounding of the human-animal relationship from the perspective of fundamental motivational forces, a link was apparent between this approach and recent developments in attitude theory. Ongoing controversy surrounding the conceptualization of attitudes has resulted in renewed interest in attitude structure and function (Pratkanis, Breckler, & Greenwald, 1989). In particular, the functional approach to attitudes, which was popular in the 1950s and 60s (Katz, 1960; Smith, Bruner, & White, 1956), has been reactivated. Katz (1960) argued that awareness of an attitude's motivational base (i.e., its source of satisfaction) is essential to an understanding of attitude formation and change, attitude-behavior relationships, the way information (especially cognitive and affective information) is used, the

distinction between reason and rationalization, and the strategies used to bring about attitude change.

Herek (1986) has developed a neofunctional theory of attitudes, based on the work of Katz (1960) and Smith et al. (1956), that differentiates between two fundamental categories of attitude function: evaluative and expressive. These categories differ in their main sources of satisfaction. The evaluative category relates to the instrumental significance of attitude objects, where attitudes depend on the object's potential for satisfying personal (self-interested) goals and needs. In the expressive category the attitude object is symbolic of some underlying concern, and satisfaction comes from giving expression to that concern. Several different types of expressive attitude have been identified, for example, the *value-expressive*, where attitudes are a reflection of an individual's central values or deeply held beliefs.

The animals' domain, however, suggests an important omission from the list of attitude functions that have been considered to date, for there has been no reference to empathy or identification as a motivational base. As early as 1941 Angyal argued that behavior results from two motivational tendencies. These are a trend towards *autonomy* which corresponds to an instrumental motive to control the environment in order to satisfy one's own needs; and a trend toward *homonomy*, or integration with others and with the environment as a whole. Angyal used both empathy and identification as synonyms for homonomy.

Using Angyal's theory as a foundation, and adapting Herek's (1986) neofunctional theory, an expanded *tripartite* model of the motivational bases of attitudes was developed (Hills, 1991), with *instrumental*, *identification*, and *expressive* motivational categories. Identification was chosen as the label for the second motivational base, rather than empathy, because it is the more comprehensive term (cf. Naess, 1984). It encompasses both positive and negative aspects (i.e., identification and alienation), which are associated with empathy on the one hand, and the "deactivation" of empathic responding on the other. Under the model it is possible for one or more motivational bases to underlie a given attitude. Moreover, those bases may or may not be consistent with one another.

Using the tripartite model, the purpose of the present research was to develop an empirically based theoretical grounding for attitudes that arise within the human-animal relationship by focusing on the motivational bases of attitudes toward animals.

Through exploratory interviews with people engaged in differing relationships with animals (e.g., animal rights group members, veterinarians, zoo workers, farmers) conflicting value perspectives became apparent between people who subscribe to the dominant status of humans (where animals tend to be perceived as subordinate to humans and available for our use), and people who recognize a fundamental kinship and equality with animals (where animals are more inclined to be perceived as independent entities deserving the same respect and care as humans). Together with the themes identified in the literature, this finding indicated that the most important motivational bases underlying Western attitudes toward animals are the instrumental, identification, and value-expressive (dominance-equality values).

A survey was then conducted that focused on the tripartite model of the motivational bases of attitudes as a theoretical foundation from which to analyze attitudes toward the treatment of animals in three subject groups: animal rights supporters, farmers, and members of the urban public. The study had a number of objectives (see Hills, 1991), the first of which is reported in this paper. It was expected that use of the tripartite model would provide the foundations for a comprehensive understanding of attitudes in the various subject groups by demonstrating the existence of unique motivational profiles.

Method

Subjects

One hundred and sixty subjects (78 females, 82 males), ranging in age from 15 to 80 years ($M = 42$), participated in the study. They comprised 51 farmers (23 females, mean age 50; 28 males, mean age 48) randomly selected from the membership lists of The Western Australian Farmers Federation, 55 animal rights supporters (27 females, mean age 36; 28 males, mean age 43) randomly selected from the membership lists of Animal Liberation (WA) and The Humane Society of Western Australia, and 54 members of the urban public (28 females, mean age 42; 26 males, mean age 39) randomly selected according to the sampling procedure described in the following section. The response rate for the three groups was 71% (farmers), 85% (animal rights supporters), and 78% (urban public).

Procedure

The study employed a survey methodology using a self-administering questionnaire described in the following section. A mail survey was used for the farmers and animal rights supporters, where questionnaires were distributed under the auspices of the organizations concerned. For the urban public sample an interviewer was used to encourage participation. She was required merely to introduce the survey in a manner similar to that accomplished by a covering letter in the mail surveys, and to drop off and collect the questionnaires.

A random sample from the urban public of Perth, Western Australia was drawn from a centrally located Local Government Division that was as representative as possible of the wider population. This was achieved by selecting an area that had no obvious idiosyncrasy (e.g., not an industrial area), and that encompassed a reasonably wide range of socio-economic status (Australian Bureau of Statistics, 1986).

Ten census collection districts (CCDs) were randomly selected from the chosen Division; a starting point and route for approaching every fifth dwelling were randomly chosen; and it was randomly determined in advance whether the interviewer would specify a male or female respondent at each dwelling. A quota of five subjects was set for each CCD.

Questionnaire

The questionnaire used in the survey comprised six categories of questions: measures of expressive, instrumental, and identification motivational bases; attitude, and belief items; and demographic items. The items relevant to the measure of motivational bases were as follows:

VALUE-EXPRESSIVE

The first section of the questionnaire comprised a set of questions relating to the dominance versus equality value perspective. These questions were devised on the basis of statements made by interviewees in the exploratory study. Four different arguments, two favoring the dominance position, and two favoring the equality position, were used. In each case one argument advocated a more extreme position than the other. Subjects responded to each of the arguments on a 7-point agree/disagree scale, which was later coded on a scale ranging from +3 to -3, with positive scores corresponding to support for the equality position and negative scores corresponding to support for the dominance position. A fifth questionnaire item assessed the relative importance of the values via a 5-point scale with anchors of "not at all important" and "one of the most important", coded from 0 to 4.

IDENTIFICATION

The second category of questions aimed at assessing the identification motivational base. Emotional responses were measured by asking subjects to imagine different scenarios involving animals (e.g., "You are waiting at some traffic lights next to a sheep transport truck. You look up and see the faces of the sheep."). The scenarios were chosen as exemplars of emotion-eliciting situations, and subjects were asked to indicate whether they felt various emotional responses (e.g., sorrow and pity for the sheep), using a 5-point emotional intensity rating scale ranging from "No" (not felt) to "Yes, intensely" (intensely felt). In each case, options were included to assess the following emotional components: Sympathy or empathic concern (focused upon the animal), empathic distress (focused upon the self), anger, aesthetic responses, and responses reflecting greater cognitive appraisal (e.g., *Frustration* at seeing feral donkeys, because they are such a menace). A free response option was also included.

After pretesting the questionnaire the final version was restricted to six scenarios (with 28 emotional response items): wild ducks swimming in a lake, a sheep transport truck, feral donkeys, battery hens, a rhinoceros killed by poachers, and killing rats and mice.

INSTRUMENTAL.

Another category of questions, interspersed throughout the questionnaire, provided a measure of the subjects' overall instrumental interest in animals. Among the questions relevant to this aspect were those relating to occupation (e.g., livestock farming), and animal organization membership (e.g., hunting organizations).

Questions relating to the content areas of meat-eating and pest control were selected, as these areas were identified in pilot tests as having the greatest applicability across the subject groups. An open-ended question asking subjects to indicate the extent of their actual experience with animals was also included in this category. Six items comprised the final scale.

Results

For each of the three motivational bases, a score was obtained for each subject by summing the relevant questionnaire items. Scores on the *instrumentality* index had a possible range of 0, indicating no instrumental interest in animals (e.g., not a meat-eater; prepared to tolerate the presence of rats or mice) to 6, indicating maximum instrumental interest (e.g., meat-eater, would NOT become a vegetarian if had to personally kill animals for food, has killed rats and mice, would never tolerate one or two rodents about the house). Cronbach's for the index was .78.

The identification base was represented by a combined *empathy* score. Contrary to an expectation that the emotional responses would form factors corresponding to empathy, anger, aesthetic reactions, and so on, a generalized empathic response occurred. Empathy or lack of empathy toward animals was accompanied by congruent aesthetic and anger reactions, and cognitive appraisals. A combined empathy score thus became feasible. It comprised the mean of the scores for the 28 affective responses, and had a possible range of 0 (indicating no empathic feelings at all) to 4 (indicating unanimous endorsement of an "empathy intensely felt" option). Cronbach's was .96.

By summing scores across the four value-expressive items a *value polarity* score was obtained with a possible range of -12 (indicating unanimous support for the dominance position) to 12 (indicating unanimous support for the equality position). Cronbach's in this case was .87.

The mean scores for the subject groups on the dependent variables instrumentality and empathy, together with the results of 3 x 2 (group x gender) ANOVAs are reported in Tables 1 and 2 (the SAS statistics package for personal computers, *GLM* procedure, was used for these analyses). In both instances significant main effects were found for both group and gender, with nonsignificant interactions. In each case all three groups were found to be significantly different from one another, with animals rights supporters having the lowest instrumentality and highest empathy scores, and farmers having the highest instrumentality and lowest empathy scores. Males were found to be significantly higher on instrumentality and lower on empathy than females.

Table 1. Mean Instrumentality Scores						
	Females		Males		Total	
	M	SD(n)	M	SD(n)	M	SD(n)
Rights	1.87	1.48(27)	2.26	1.70(27)	2.06	1.59(54)
Public	3.50	1.48(28)	4.84	1.03(25)	4.13	1.44(53)
Farmers	4.86	1.46(21)	5.68	0.55(28)	5.33	1.11(49)
Total	3.30	1.88(76)	4.26	1.89(80)	3.79	1.94(156)
Note. Group effect: $F(2,150) = 76.72, p < .01$, with Tukey-Kramer post hoc comparisons ($\alpha = .05$) indicating significant differences between all three groups. Gender effect: $F(1,150) = 15.67, p < .01$. Group x Gender interaction: $F(2,150) = 1.70, p > .05$.						

Table 2. Mean Scores for Empathy						
	Females		Males		Total	
	M	SD(n)	M	SD(n)	M	SD(n)
Rights	3.33	0.36(27)	3.03	0.58(28)	3.17	0.50(55)

Public	2.47	0.84(27)	1.89	0.71(24)	2.20	0.83(51)
Farmers	1.62	0.86(23)	1.10	0.36(28)	1.33	0.68(51)
Total	2.51	0.99(77)	2.01	0.99(80)	2.26	1.02(157)

Note. Group effect: $F(2,151) = 106.11, p < .01$, with Tukey-Kramer post hoc comparisons ($\alpha = .05$) indicating significant differences between all three groups. Gender effect: $F(1,151) = 20.47, p < .01$. Group x Gender interaction: $F(2,151) = 0.72, p > .05$.

An important question concerned the independence of the value-expressive component. That is, could value polarity scores be accounted for in terms of the relationship between instrumentality and empathy, rendering a separate value-expressive component redundant? For example, high instrumentality and low empathy might be expected to give rise to support for the dominance position, and vice versa. Alternatively, would there be a unique effect for value polarity?

To answer this question an ANCOVA analysis was performed on value polarity scores, with instrumentality and empathy acting as covariates. Used in this way ANCOVA answers the question: Are there effects for value polarity over and above those accounted for by existing differences on instrumentality and empathy? Both the group and interaction effects were significant: Group, $F(2,144) = 21.43, p < .01$; group by gender interaction $F(2,144) = 3.98, p < .05$. However, the main effect of gender was not, $F(1,144) = 0.06, p > .05$. Mean scores are reported in Table 3 and Figure 1.

Table 3. Mean Scores for Value Polarity						
	Females		Males		Total	
	M	SD(n)	M	SD(n)	M	SD(n)
Unadjusted Mean Scores for Value Polarity						
Rights	9.41	2.53(27)	8.00	4.16(26)	8.72	3.47(53)
Public	-0.43	4.13(28)	-0.50	4.83(26)	-0.46	4.44(54)
Farmers	-3.26	5.38(23)	-6.86	3.50(28)	-5.24	4.76(51)
Total	2.14	6.79(78)	0.04	7.41(80)	1.08	7.16(158)
Mean Scores for Value Polarity Adjusted for the Covariates Instrumentality and Empathy						
Rights	5.57		5.19		5.38	
Public	-1.31		1.16		-0.08	
Farmers	-1.31		-2.92		-2.12	
Total	0.98		1.14			

Figure 1. Value polarity means (unadjusted, and adjusted for the covariates instrumentality and empathy).

Analytical comparisons among the adjusted cell means ($\alpha = .05$) were then conducted using the *t* test option available in *SAS GLM*. These indicated that after differences in instrumentality and empathy had been taken into account there were unique value polarity differences as follows: (a) in the urban public group males were significantly different from females, (b) among males all three groups were significantly different from one another; and (c) females in the animal rights group were significantly different from females in both the other groups.

Comparisons among observed means (i.e., actual value polarity means *not* adjusted for covariates) indicated a significant difference between male and female farmers, but no significant difference between males and females in either the animal rights group, or the urban public group. Contrasts among males and females, revealed that all three groups were significantly different from one another for each gender.

Comparing results for adjusted and unadjusted means leads to the conclusion that observed gender differences on value polarity in the farmer group can be accounted for by the covariates, as can differences between females in the farmer and public groups. However, differences among males, and between female animal rights supporters and other females, are over and above what would be expected on the basis of the covariates.

Most important was the significant gender difference for adjusted means in the urban public, which contrasts with the lack of difference in the unadjusted means. If the value-expressive base is merely a function of instrumental and empathic motivations, there *should* have been a difference in the observed means for the urban public (with males favoring dominance and females favoring equality), as males were significantly more instrumental, and significantly less empathic than females. The presence of no difference in the observed means could only be accommodated in the ANCOVA analysis by a significant contrary effect. That is, considering the differences in instrumentality and empathy, males were more supportive of the equality position than expected, and females were more supportive of the dominance position than expected.

An expectation regarding the value-expressive base was that animal rights supporters and farmers would have value-expressive bases of equal magnitude (but in opposite directions). To investigate this, value polarity scores for the public and farmers were recoded to reverse their signs and two planned comparisons were conducted between female animal rights supporters and male farmers, and male animal rights supporters and male farmers. Female farmers were not considered, as they had already been found to be significantly different from their male counterparts on their unadjusted value polarity scores. While the difference between male farmers and female animal rights supporters was significant, $F(1,152) = 5.21, p < .05$, the difference between male farmers and male animal rights supporters was not, $F(1,152) = 1.03, p > .05$.

Discussion

With respect to the three major motivational bases in the domain of attitudes toward animals (i.e., instrumental, identification, and dominance versus equality value-expressive), the results

indicate that relative to the other groups, animal rights supporters have a weak instrumental base, a strong identification base, and a strong value-expressive base (supporting the equality position). Farmers have a strong instrumental base, a weak identification base, and a moderate to strong value-expressive base (supporting the dominance position). The urban public has moderate instrumental and identification bases, and a relatively weak value-expressive base.

Gender differences on instrumentality (favoring males) and identification (favoring females), were much less in evidence on value polarity, and were confined to female and male farmers.

The results provide a basis for understanding the attitudes of the subjects involved in the present study, for they support the expectation of a unique motivational profile for each of the six subgroups, as illustrated in Figure 2. (Note in Figure 2 that all differences between groups and genders are significant, except for gender differences in the public and animal rights groups on value polarity. The difference between male animal rights supporters and male farmers on absolute value polarity scores is also not significant.) At the same time, Figure 2 provides an indication of similarities among the subgroups. The similarity between female farmers and male members of the urban public on instrumentality is immediately apparent, and there is a suggestion that the urban public (particularly males) may be more closely aligned with farmers than with animal rights supporters. This is consistent, after all, with the fact that livestock farming is culturally acceptable.

Figure 2. *Motivational bases of subject groups. (Mean scores for the subgroups on each of the motivational base variables.)*

Note. Positive and negative symbols indicate value polarity orientation. Positive indicates support for the equality position; negative indicates support for the dominance position.

The results for animal rights supporters and farmers are not surprising. Even so, it is important to note that members of animal rights organizations evidence heightened empathy. Philosophical positions on animal rights and animal liberation make the point that these are rational positions, not dependent on emotion (certainly Singer, 1975, has stressed that one does not have to be an "animal-lover" in order to support animal rights). However, these results indicate that empathy is necessarily associated with support for the animal rights position whether it is a causal factor, and how it develops, are questions for future research.

The finding of a close to neutral position on value polarity for the urban public is important, as it has implications for the implementation of policy in regard to our treatment of animals. Furthermore, relatively high levels of ambivalence were apparent within individuals (i.e., some tended to agree or even strongly agree with both equality and dominance arguments). One might expect this to give rise to cognitive dissonance, so that individuals are constrained to resolve the issue one way or the other. That this does not happen is probably attributable to the relative unimportance of their animal values among the urban public. Nearly 67% of the urban public sample considered that the general principles they hold about animals were not too important or only somewhat important compared to the other concerns in their life. As a consequence, ambivalence may be easily tolerated, or the full implications of different value perspectives may be overlooked. People may subscribe to the general idea that it is possible to treat animals with the same care and respect as humans, while still making use of them, as pets, for example, or to

supply wool. But, they do not appear to go on to address the inconsistency that arises between the notion of equality and consumptive uses of animals, for example, using them as food.

In any event, it is as if equality and dominance exist as two orthogonal dimensions for the urban public, while for animal rights supporters, and to a lesser extent for farmers, they have become opposite poles of a single dimension.

The relative lack of importance attached to their animal values by the urban public, and their tendency toward ambivalence and neutrality as a group, does not necessarily mean they do not care about animal issues. Rather, they have no consistent underlying value basis for their attitudes, which are more likely to vary depending on the circumstances of the particular issue, for example, how much they are directly affected, the emotional appeal of the animal concerned, the degree of cruelty involved, the prevailing social norms, or the persuasiveness of different arguments.

The purpose of this study has been to develop a theoretical foundation and framework with which to understand attitudes toward animals, and the results are promising. However, there is clearly a need to extend this approach to other subject groups, using larger samples (e.g., veterinarians; wildlife officers; zoo keepers; pet breeders and traders; abattoir workers; different kinds of farmers; hunters and fishing enthusiasts; and members of the general public with different socio-economic, educational, residential and ethnic characteristics).

There is also a need to examine the various motivational bases in much more detail, and in regard to specific content areas. For instance, it is important to understand how "scientific" values interact with dominance and equality for people with scientific training (such as veterinarians and biologists), as typically these people play an important role in the management of animal issues.

Similarly, the identification base requires extensive investigation. In another part of the present study (see Hills, 1991) there was some indication that reduced empathy among farmers is confined to those animals that have instrumental significance for them. All three groups reported heightened empathy in response to the rhinoceros scenario, which had no instrumental significance for any of them. A much wider range of animals and scenarios needs to be assessed in this regard. Moreover, the very nature of empathy and identification needs to be addressed. How might the experience of empathy differ across individuals and across types of animals (e.g., pets, as opposed to wild animals)?

Important practical applications of this work are in the area of societal decision-making. The processes of public debate and policy formation could benefit from a greater understanding of motivational forces as this has implications for the scope of solutions sought. For example, were a ban on battery hen farming to be contemplated on the grounds of our empathic emotional response, recognition of the instrumental importance of this activity to the farmers involved would necessitate simultaneous attention to the need to safeguard the welfare of the farmers as well as the welfare of the hens. Rather than the issue being debated as one of save the hens *versus* save the farmers, it would need to become one of save the hens *and* save the farmers (e.g., by providing them with financial and other resources to alter their farming methods). Explicit

recognition of self-interested motivations might also make the distinction between legitimate self-interest and greed more apparent.

However, it is one thing to speculate on the need for motivational forces to be acknowledged, but quite another to implement such a policy. Hence, there is clearly a need for research into workable ways of incorporating motivational bases into the decision-making process. This is especially so when they are in the form of intangibles such as empathy and identification.

Note

1. Requests for reprints should be sent to Adelma M. Hills, Department of Psychology, Edith Cowan University, Joondalup Drive, Joondalup, Western Australia 6027. Dr. Hills' main areas of interest are emotion, motivation, and environmental psychology, especially the meaning and importance of the natural environment to humans. For the past seven years she has been researching people's perception of and attitudes toward animals.

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