Learning about the Emotional Lives of Kangaroos

Cognitive Justice and Environmental Sustainability

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ABSTRACT

This paper reports on research into wildlife emotion, interpretation and usefulness as a means for broad-scale learning about environmental sustainability. Part of the Australian landscape for 16 million years, the iconic kangaroo has characteristics that make them suited, as wild animals, for humans to learn about environmental integrity. A "new way of knowing" about sustainability is proposed that seeks to learn directly from wildlife through their emotional states using a "being-for" (Bauman 1995), relational (Derrida 2002), ethic of care (Donovan 1996; Noddings 1984; Kheel 2008). Within the context of cognitive justice we propose wildlife knowledge systems that need to be respected. We incorporate recent research on affective neuroscience in mammals (Panksepp 1998 and 2004) into our own work in rehabilitating large numbers of seriously injured kangaroos prior to their release/return to the wild (Garlick and Austen 2010). This work enables identifying and interpreting emotion markers in various environmental contexts and their consequent sustainability. Progressing from a case example of learning through a particular transformational animal encounter, to where an entire community might be similarly transformed to address sustainability questions is possible to conceptualise through the "ecoversity".

Keywords: Relational ethics, affective neuroscience, ethic of care, environmental sustainability, kangaroos, ecoversity, cognitive justice; wildlife emotion; forms of togetherness, animal knowledge system.

1. INTRODUCTION

For far too long we have relied on human exceptionalism (Plumwood 2007) in tackling the urgent questions of our planet's environmental sustain-

ability. The tacit assumption of a transcendent animal/human boundary ensures our learning is predicated on lopsided anthropocentric perspectives. Human exceptionalism and anthropocentrism has been the mainstay of Western modernity, metaphysics, environmental science, ethics and humanism (Derrida 2002). Over the millennia this divisive and unbalanced way of acquiring knowledge has enabled Western civilisation to inflict astoundingly barbarous and destructive results on the environment.

Debates, discussions, recommendations and reports addressing the problems of environmental, economic and social crises of unsustainability have proliferated over past decades. Growing public and government awareness of climate change and the need to make dominant forms of practice sustainable is old news for many, as is the belief that solutions are to be found in scientific, technical and market fixes. The monetarist conservation and preservation practices of the past thirty years have done little to address escalating greenhouse gas emissions and biodiversity loss, and auditing and valuation practices have had limited impact. The argument that there is no limit to human creativity and knowledge may not always accord with a common planetary good and what a fair-minded society might expect. Their creativity and new knowledge may not always accord with a common planetary good and what a fair-minded society might expect.

Rather than "educated" humans saying only what they are "good at" on matters to do with environmental sustainability, they should be reflecting more on the ethical contribution of what they are "good for", as much of the environmental mismanagement we see today results from the decisions and actions of educated human "experts" (Orr 1992). "Good-for" is like "being-for" (Bauman 1995), enabling activity, engagement and contribution without any reciprocal expectations. Human exceptionalism, which mostly performs and exhibits "good at" characteristics, has proven dangerous for the environment.

By excluding the knowledge held by the non-human animal inhabitants of the environment, that is, animal knowledge systems, science disciplines may be challenged as not fully meeting their own epistemological rules of empiricism – particularly the correspondence and comprehensiveness tests. Ecology, prone to focus only on the collective biota, is one such discipline in which these rules of empiricism might be challenged.

This paper reports on our research into wildlife emotion, and its interpretation and usefulness as a means for learning more about environmental sustainability. Having been a part of the Australian landscape for 16 million years, our belief is that the globally iconic kangaroo can tell us much about the environment. This would otherwise remain unseen and unheard unless we are able to have a direct means of communication with it.

The social, affectionate and gentle nature of kangaroos, their ability to range over large areas of the landscape, their vulnerability in limiting environments, the overtness in the expression of their emotions, and the strong anthropocentric instrumentalism and barbarism shown towards them by ecologists, conservationists and Australian governments, supposedly concerned about environmental sustainability, make this wild animal highly relevant to human learning about matters of environmental integrity. We argue they have significant ethical agency to offer in our learning about questions of environmental sustainability.

Like an out-of-control grand panjandrum, this human world shows no bounds to its ingenuity in finding even more grotesque ways, based on ever more flaccid arguments, to make a misery of the lives of innocent non-human animals of all kinds and in all situations, when the answers too many of our environmental questions reside with their innate and intrinsic knowledge. It is unfortunate that by adopting a "mastery of nature" approach (Plumwood 1993) and ignoring the knowledge of non-human animals, many aspects of wildlife science contribute to this misery.

2. Literature themes

A "new way of knowing" about sustainability is proposed that seeks to learn directly *from* wildlife through their emotional states, as individuals and in their social groups, through a "being-for" (Bauman 1995), relational (Derrida 2002), ethic of care (Plumwood 1993; Donovan 1996; Kheel 2008). Based on this ethic, we incorporate recent research on affective neuroscience in mammals (Panksepp 1998 and 2004) into our own work in rehabilitating large numbers of seriously injured and traumatised kangaroos prior to their release/return to the wild (Garlick and Austen 2010). This work provides the building blocks for identifying and interpreting emotion markers in various contexts, including the wild environment and its sustainability.

This approach to knowing about environmental sustainability seeks to go beyond knowing about animal biophysics and biota only from obtuse and remote scientific experimentation and simple observation. Introducing learning into the mix of an encounter with a wild animal, underpinned by an ethic of care, has interesting implications, not only for a number of environmental science disciplines (particularly wildlife ecology) but also for institutional environment managers.

Such an approach to the acquisition of knowledge not only reflects agency but is consistent with the notion of cognitive justice and the democratisation of knowledge (Visvanathan 1997) because it is concerned with extending

our source of knowledge about environmental sustainability beyond the human and the scientific and into and beyond the realm of experience or tacit knowledge of those from non-human animal worlds that inhabit these environments. We can call these "Animal Knowledge Systems" (AKS).

Six neural emotional states (joy, separation, anger, relaxation, nurturance, and sexuality) are used and a range of kangaroo markers that reflect these states are identified in both in-care and the wild contexts. From these, reinforcing and restricting environments for wildlife are identified with respect to two key emotional states for mammals identified by Panksepp (1998 and 2004). These are "seeking" to engage with opportunity in the wider world in terms of their capability (Nussbaum 2003 and 2011), and "fear/escaping" from a limiting environment to places where capability can be exercised more fully. The classification of a wildlife environment as reinforcing or restricting is a clear indication of its health from the perspective of a wild animal – an inhabitant of millennia rather than that of an episodic human visitor.

The task of progressing from a case example and a particular environmental context, in which there is learning through a particular transformational animal encounter, to one in which an entire community or numerous communities might be similarly transformed to address sustainability questions in other contexts can be conceptualised. To advance this notion of a "commons" we have elsewhere suggested the idea of the ecoversity as a learning framework for engagement between humans and the environment (Garlick et al. 2009; Garlick and Matthews 2009; Matthews et al. 2009; Matthews and Garlick 2012). The ecoversity, with its foundation in context-based relational ethics and learning provides a mechanism to help bridge the gap between human and non-human animals. It can facilitate a transformative encounter which can generate the knowledge to foster creative and ethical solutions to animal welfare and environmental sustainability.

3. Derrida and transformative encounters with wildlife

Close and mutual encounters with wildlife can be special and transformative experiences that enable learning that can take us beyond typical biophysical and virtual understandings. Learning from individual encounters with wildlife is unconstrained by the anthropocentric and automata constructs of much conservation and ecology, which are based on a hierarchical value of contribution to the good of the biota (Leopold 1968; Callicot 1987). Such conservation and ecology, unfortunately, reason out (some-

times advocating brutal methods) the energy, emotion, personality and individuality of wild animals. However, as with quantum physics and the Tao, the whole will not exist without the energy of the interrelationship of the individual parts, and the parts are dependent on their interconnection with other parts in a holistic system (Kheel 1985).

It is the Cartesian view of the wild animal as being unexceptional in anything other than its physicality that has resulted in ecology and conservation regarding wildlife individuality as unimportant in consideration of the environment, unless of course the species is considered to be on the verge of extinction (Leopold 1968; Callicot 1987). Even then neoliberal "science" will question the cost (Clements et al. 2011). This, it would seem, justifies the aggression of these sciences and their inherent cruelty toward individual wildlife as a socially acceptable method for maintaining a biota. Leopold, in various publications, was a strong proponent of this practice and many in the ecology discipline have not progressed far beyond it. When it comes to wildlife, such disciplines not only promote animal cruelty but also seriously short-change us in our learning about things that are critical for our planet's environmental sustainability.

In *The Animal That Therefore I Am*, Derrida (2002) provides two important connected thoughts that can assist us in learning in transformative ways through an encounter with wildlife. The first of these is equality in suffering between humans and animals. This sees animals and humans as fellow creatures with a common finitude. It also sees animals as individuals and not the collective ordinarily portrayed as holders of certain rights and entitlements (Regan 1983); or placed in some hierarchical order according to notions of consciousness or language (Singer 1984); or as part of some living ecosystem (Leopold 1968). As Nussbaum reminds us:

> As for aggregation across lives: animals pursue not simply the avoidance of pain but lives with many distinct components, including movement, friendship, honor and dignity. It seems important to retain a sense of the separate importance of each of these elements. (2011, 160)

The second thought is that once the boundary between human and non-human animals is erased, there can be transformative learning through engagement. This is the kind of human-animal engagement that Derrida says can interrupt our being, challenge how we think about whom we are and call us into some kind of responsibility to take action (Derrida 2002).

Human transformation in the presence of an animal is a process of learning about us as humans through our understanding of animal capabilities. It is not restricted to those animals which might head any hierarchy of anthropocentric cognition testing. Whales, dolphins, great apes and chimpanzees

are often cited in this regard, but Derrida was never species-specific in relation to the transformative impact of human/non-human animal relations.

When faced with acting on any learning from engagement with an animal we are limited by the unsatisfactory human tools on which we have to draw. The first of these is to respond to animal suffering with arguments and images that connote compassion and tolerance. However, these are anthropocentric concepts and while a moral onus is implied in them, no actual transformational emotional engagement with animal suffering of the "being-for" kind need necessarily occur because of them. Viewing animals virtually, as is increasingly the case in modern society, is an example of a disengaged association. There is therefore no attempt to view the animal as an equal subject, of equal worth, to a human. In this there is, therefore, no attempt to connect this suffering to our own human finitude, and definitely no thought that there might be learning possible from animals. The second of these unsatisfactory tools is to make moral and ethical choices based on a hierarchy of utility and relative animal cognition and consciousness. The approach is speciesist, giving preference to some animals over others. The tests for cognition, consciousness, pleasure and pain are anthropocentric and ignore the complexity of animal diversity and emotion.

4. Animal emotion as a marker for communication and human learning

Recent thinking in behavioural neuroscience suggests a neural basis for emotion and consciousness affect in mammals (human and non-human), birds and selected sea life (Panksepp 1998 and 2004; Low et al. 2012). This takes us beyond the human-animal dualism that previously separated animal emotion from notions of consciousness in neuroscience and psychology. Previously held back by a lack of animal data, and human exceptionalism in brain function research, it is now argued that predictions can be made about animal emotion, despite limitations of language, from laboratory studies on human brain function (Panksepp 2004, 2).

Such consciousness might assist in our learning about sustainability markers from animal emotion when there is a trusting relationship with wildlife. This is a different, more effective and more ethical way of gathering information about wild animal emotion than the usual laboratory reward-stimulation tests carried out on animals. In humans, emotion markers can be measured through skin conductance, endocrine response, heart rate, blood pressure and similar laboratory tests. In wildlife however, in order to interpret whether an environment is healthy, we need to depend on a rela-

tionship with the animal to allow us to determine emotion markers. With wildlife, in our view, emotion markers can be revealed through the relational ethic of care of the "being-for" kind. It is argued that emotions (affection, joy, sadness, anger, anxiety, aggression, fear, etc.) suggest a form of language and communication (Panksepp 1998 and 2004) and can potentially provide intelligence to us on the well-being of a wild animal in its habitat.

Panksepp has identified two key emotional brain circuits in mammals. The first is "seeking/expecting", where the animal has expectancy, an aspiration, and a wanting to engage with the wider world: "[…] the neuroscience evidence indicates that all mammalian brains do contain a general purpose seeking system designed to actively engage the world, especially in its life-sustaining resources" (2004, 17). This neural circuit seems consistent with the capability approach articulated for humans by Sen (1985) and for animals by Nussbaum (2003), based on opportunity achievement. In terms of the natural environment seeking/expecting emotional circuits appear to equate with a healthy, satisfying and reinforcing habitat.

The second key emotional brain circuit in mammals is "fear/escape", which seems consistent with responding emotionally to a harming or limiting habitat and environment. These notions of reinforcing and limiting environments for wildlife need to be considered in making an assessment of environmental sustainability. In addition, Panksepp has identified at least five other basic emotional systems common to mammalian social affect, viz.: anger, sexuality, nurturance, distress and joy. Panksepp suggests these emotions are important in influencing physical and mental conditions in humans, such as pain, depression and other psychiatric disorders. There are likely to be similar effects for animal conditions including recovery from illness and injury, although as Panksepp notes (2004, 27-9) there are species differences in the relative significance of each emotion. The recent Cambridge Declaration (Low et al. 2012) has stated: "[…] humans are not unique in possessing the neurological substrates that generate consciousness. Non-human animals, including all mammals and birds, and many other creatures, including octopuses, also possess these neurological substrates".

5. A "BEING FOR" ETHIC OF CARE AND RECIPROCITY

Neoliberal relations favour fragmentary, momentary and episodic encounters characterised by "values" of competition, efficiency and individualism. These are the same superficial connections that humans, in general, and some scientists in particular, have with animals – particularly those in the wild. Action-oriented narratives of animals in the wild on film and televi-

sion, or in "wildlife" parks, are the closest most humans are prepared to be to the natural world of wild animals. Other episodic connections with animals (and wildlife in particular) are more sinister and involve cruelty. Institutions, companies and individuals that approach wildlife with the objective of making money view it as a "resource" or a "pest". Such people are unable to have a transformational experience with an animal and thereby unlock knowledge about sustainability.

Our concern with the discipline of wildlife ecology is that it draws conclusions about environmental sustainability and wildlife habitat through an objectified, episodic, collective perspective towards the animal, when so much more knowledge can be gained directly from the animal, individually and in groups through its various emotional states when there is a "being-for" ethic of care. Ecologists without a "being-for" ethic of care cannot have transformational engagement with wild animals. They tinker with and then discard the wild animal and draw conclusions based on partial knowledge and human exceptionalism. Their focus is on the quantitative rather than the qualitative characteristics of wildlife. If the ecologist assesses there that there are "too many" wild animals of a particular species a programme of killing is usually advocated; if "too few", a programme of captive breeding is advocated (Leopold 1968). Mathematical modelling of these gross physical relationships has recently become popular (Clements et al. 2011). Such "science" ensures we make little real progress on our broader knowledge of sustainability because it assumes humans have all the answers and all the world's environmental problems can be "managed", or even solved, by experimentation *on* animals by human scientists rather than by learning *with* them through relational transformation.

Wildlife carers, whatever the species they care for, can learn much when they employ a "being-for" ethic of care. In our view, ecology can and should learn from the methods and experiences of ethical wildlife carers on matters relating to environmental sustainability.

Bauman's (1995) classification of forms of togetherness provides a useful tool for getting to the heart of what engaging with wildlife should be like if it is to stimulate transformational learning by humans in the way Derrida argued, and be useful in expanding our knowledge about environmental sustainability using animal emotion markers. Bauman describes "being-alongside" and "being-with" as fragmented and episodic encounters characterised by a lack of consequence. In a "being-alongside" modality the participants exist only in a co-presence with others. Participants move from a "being-alongside" to a "being-with" modality where there is a mutual dependency – but only in so far as it relates to what the topic at hand requires (Bauman 1995, 50). This is our concern with the disciplines

of wildlife ecology and other sciences that draw conclusions about wildlife without a "being-for" engagement. Derrida seeks much more in consciousness from an animal encounter than an episodic or non-consequential contact. Using Bauman's (1995) ideal "forms of togetherness" the most complete form of togetherness with an "other" is "being-for".

Being-for is a leap from isolation to unity; yet not towards a fusion, that mystics' dream of shedding the burden of identity, but to an alloy whose precious qualities depend fully on the preservation of its ingredients' alterity and identity. "Being-for" is entered for the sake of safeguarding and defending the uniqueness of the Other; and that guardianship by the self as its task and responsibility makes the self truly unique, in the sense of being irreplaceable; no matter how numerous the defenders of the Other's unique otherness may be, the self is not absolved of responsibility. Bearing such a task without relief is what makes a unique self out of a cipher. Being-for is the act of transcendence of being-with (Bauman 1995, 51).

According to Noddings (1984 and 2002) a caring encounter will have three elements: First, A is consciously motivated to care for B. Second, A performs some act of care that accords with the consciousness and motivation revealed in the first element. Third, and significantly, B recognises that A cares for B. According to Noddings, there is no contractual requirement in this last element for B to exhibit any mutuality or reciprocity. Indeed, one might expect that in the case of a wild animal (B) that has had a carer (A) there would be no reciprocity by B. However, we have found differently and the answer to this is found in the notion of animal agency.

6. Engaging with the kangaroo

At our wildlife recovery centre we have around 150 severely injured and sick macropods (mostly kangaroos) and wombats coming into care each year. These animals range in size from the tiny (several hundred grams) to the very large (70 kg). Some are simply orphaned infants, some are old and in need of some recuperation, and many have a variety of injuries that include limb, pelvic and skull fractures, severe wounds or head injuries, as well as serious issues such as pneumonia and stress-induced illness. Almost every day we witness and respond to the suffering and trauma that uncaring and sometimes cruel humans inflict on wild animals with their motor vehicles, fences, uncontrolled dogs, guns wielded by thugs, and the cruel practices of governments and farmers.

Recovery of an injured macropod may take 12 months or more depending on the extent of the injury or illness. Once the veterinarian has carried

out the initial clinical work there is much more to be done before an animal recovers enough to be returned back to its natural environment with its kin. Tasks include regular feeding and, if necessary, nutritional support, antibiotic treatment, splint changes, wound dressings, physiotherapy and exercise, and, finally, translocation prior to release in a wild environment as safe from human intervention as possible. Each year around 80 fully recovered animals are transported from our recovery centre and released to their natural environment in social groups of ten or more (Garlick and Austen 2010). Our most recent translocation and release included 30 kangaroos ranging in size from 14 kg to 55 kg.

Trust, kindness, and appropriate auditory, olfactory, visual and tactile communication between the injured or sick wild animal and the human carer are vital over potentially long periods to enable a successful outcome. An attitude of respect, encouragement and persistence is as important for the injured or sick kangaroo as appropriate veterinary treatment. Being with others of its kin is also important. Understanding animal communication through close and sensitive observation and interaction and responding to animals in ways consistent with such communication form an important basis for having good relations with injured wild animals and for monitoring their emotional state.

Kangaroos have very long memories and while they naturally avoid human contact and correctly regard humans as predators, they can maintain a long-lasting relationship over many years with their human carer if the care has been of the "being-for" kind. There is no habituation with these wild animals, solely a special relationship with the particular care giver. This facilitates daily engagement and monitoring when they return to their wild environment. These visits to the wild environment allow observation of kangaroo emotional markers of stress and relaxation. These animals are extremely wary of humans and will not approach anyone except the carer who has exhibited the characteristics of a "being-for" ethic toward them.

When we visit the wild in a location where we know that within hearing distance there are kangaroos whom we have cared for, it is possible with about 20 minutes of calling to attract up to 36 kangaroos, as well as their offspring. These kangaroos recognise the carer's voice and even, after a number of years, will allow physical contact.

These two acts by wild animals: the act of recovery from severe injury or illness and the act of recurrent visits to their carer after return to the wild, provide evidence of the practical effectiveness of a "being-for" modality of togetherness in its application to wildlife. Noddings (2002) suggests reciprocity from the wild animal to the human carer is one of the key require-

ments of an ethic of care. Of particular significance for this paper is the fact that this reciprocity can be as agency in the form of a transfer of knowledge from wild animal to human carer.

Table 1 brings together a number of neural emotions, outward manifestations of these emotions as they relate to the kangaroo, and what they mean in terms of the environment in which they live.

The first column in *table 1* lists the five social emotions for mammals, taken from Panksepp (2004, 22), together with an additional emotional state, relaxation, based on our observation of macropods. These social emotions are within the context of a seeking/expectancy/wanting scenario or a "fear/escape" scenario. Column two lists the outward indicators associated with each emotional state. These outward indicators have come from close observation over a long period. Column three attributes an environmental context and whether the environment reinforces seeking emotions, or is limiting or restricting in that it generates fear and escape emotions.

Table 1. – Connecting wildlife emotion to environmental health: the kangaroo.

Neural emotion state	Outward indicators	Environmental opportunity / context
Joy (play)	Hooning, kicking legs into the air, boxing with kin, chasing kin, eye expression.	Reinforcing
Separation, distress (panic)	Vocal, running into objects in panic, eye expression, erect and extended posture, licking forearms, rapid respiratory rate flared nostrils.	Restricting
Nurturance (care)	Preening, embracing kin, body contact, protective behaviour by dominant males.	Reinforcing
Sexuality (lust)	Courtship behaviour, pairing, long-term male/female friendships.	Reinforcing
Anger (rage)	Vocal, eye expression, posture.	Restricting
Relaxation	Lying on back asleep, mothers relaxing pouch muscle, mothers allowing small infants to exercise outside pouch.	Reinforcing

7. Cognitive justice

The notion of cognitive justice and the democratisation of knowledge (Visvanathan 1997, 2002 and 2009; Santos 2007; Odora Hoppers 2009) is a humanist concept we can use to signify the importance of regarding the innate and experiential knowledge of animals, and the existence of Animal Knowledge Systems, in helping understand questions of environmental sustainability. Cognitive justice was coined by Visvanathan to represent the need for a plurality of knowledge sources and processes to offset the straightjacket disciplinary culture of traditional human science analysis. It is an ethical principle that equally values diverse sources of knowledge (knowers) without drawing conclusions about relative knowledge superiority. We see this notion as balancing current episodic ecological views and their epistemological failure as science, about wildlife and the environment with knowledge from in-situ inhabitants because, as Visvanathan (2009) suggests, it opens us up to the "invention of possibilities". As Visvanathan states:

> Cognitive justice recognises the right of different forms of knowledge to coexist, but adds that this plurality needs to go beyond tolerance or liberalism to an active recognition of the need for diversity. It demands recognition of knowledges, not only as methods but as ways of life. This presupposes that knowledge is embedded in ecology of knowledges where each knowledge has its place, its claim to a cosmology, its sense as a form of life. In this sense knowledge is not something to be abstracted from a culture as a life form; it is connected to livelihood, a life cycle, a lifestyle; it determines life chances. (2009)

8. The ecoversity: a practical approach to community learning about sustainability from wildlife engagement

The task of progressing from a case example in which there is learning through a particular transformational animal encounter to one where an entire community or a number of communities might be similarly transformed, to address sustainability questions, is possible to conceptualise. To advance this we have elsewhere suggested the idea of the ecoversity as a learning framework for engagement between humans and the environment (Garlick et al. 2009; Garlick and Matthews 2009; Matthews et al. 2009). The ecoversity, with its foundation in place-based relational ethics and learning provides more than a mechanism to help bridge the gap between human and non-human animals. It can facilitate a transformative encounter

which can generate the knowledge to foster creative and ethical solutions to animal welfare and environmental sustainability. It therefore has the potential to assist in resolving the current conservation and animal welfare dichotomy (Kheel 1985 and 2008). It can also open pathways between science and environmental sustainability knowledge generated through transformational animal encounters.

The goal of the ecoversity approach is to find alternatives to the non-relational education practices in sustainability learning "that got us into trouble in the first place" (Orr 1992, 24). The ecoversity approach proposes lifelong learning and enterprising action within a spatial and ethical context (Garlick and Palmer 2008). Just as neuroscientists propose that there are critical and sensitive periods in human life that generate multiplied returns from learning (Cunha and Heckman 2007); it can also be argued that there are critical and sensitive places or contexts for learning about environmental sustainability and which contribute to multiplied returns on learning investment (Garlick 2011). The ecoversity can be such a context for learning. Moreover, the ecoversity approach promotes a new and dynamic community-based form of eco-literacy which involves relational learning about environmental sustainability.

We see parallels between the concept of the ecoversity and the concept of the "commons" used injunction with cognitive justice. In this sense the "commons" reflects a place-based notion of connectivity with what "has been", "what is" and "what could be" – a connection between humans and nature, and a connection between dreaming and fact (SARChi Retreat 2012).

Following Sacks (2008), the goal of the ecoversity is to teach us about the environment we are already a part of. It does this by sharing knowledge, identifying local/global problems and solutions, stimulating ethical debates and challenging unsustainable development and the excesses of transnational capitalism (Matthews et al. 2009). It is not therefore that sustainability should be integrated into learning institutions, but that these institutions need to transform themselves into the integrated holistic communities implied and required by sustainability perspectives (Sterling 2004).

9. Conclusions

The purpose of this paper has been to show that our knowledge about the solutions that contribute to the environmental sustainability of the planet needs not be restricted to episodic investigations on animals based on human exceptionalism, incomplete science or an untrammelled belief in human rationality. We have endeavoured to suggest there is another

hitherto-untapped source of knowledge that can be gleaned from those wild animals that are resident in the environment and that the means of conveying this knowledge is by understanding the overt behavioural affects of wild animal emotion. This notion of animal knowledge systems is consistent with the humanistic concept of cognitive justice and the wider view of the democratisation of knowledge.

In this paper, we have attempted to demonstrate that the kangaroo represents an ideal wild animal to learn more about environmental sustainability from through emotional markers that can be ascertained through a relational ethic of care. It was also suggested that such contextual understandings about wild animal knowledge could be generalised through the learning concept of the ecoversity.

This approach puts wild animal carers, who employ a relational ethic of care, in a position of making contributions to aspects of science and the environment through their ability to elucidate knowledge from wild animals through emotional affect. Such contributions should be formalised and would add significantly to the current inadequacies within wildlife ecology and other sciences where there are epistemological shortcomings of empiricism. We also propose the ecoversity as a means of applying this approach to wider sets of circumstances in our community knowledge about environmental sustainability.

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