Sustainability **2013**, *5*, 1266-1281; doi:10.3390/su5031266

OPEN ACCESS

sustainability

ISSN 2071-1050

www.mdpi.com/journal/sustainability

Article

Conservation Psychology: A Gap in Current Australian Undergraduate Psychology Education?

Elissa Pearson

School of Psychology, Social Work & Social Policy, University of South Australia, GPO Box 2471, Adelaide, South Australia 5001, Australia; E-Mail: Elissa.Pearson@unisa.edu.au; Tel.: +61-8-8302-4843

Received: 20 December 2013; in revised form: 7 March 2013 / Accepted: 7 March 2013 / Published: 19 March 2013

Abstract: Human actions have contributed to numerous environmental challenges, including climate change and a significant loss of the world's biodiversity. As the scientific study of human thought and behaviour, psychology has much to offer in better understanding these issues, as well as fostering greater sustainability in human actions. Yet, despite this recognition, and increasing calls from leaders in psychology education to produce graduates capable of applying their disciplinary knowledge to such real-world issues to solve worldwide behaviourally-based problems; this may not be adequately addressed in current psychology training. The present study assessed the content of all APAC (Australian Psychology Accreditation Council) approved psychology programs within Australia to determine the proportion which offered a psychology-focused course (unit) specifically in conservation or sustainability. Based on the data advertised through each university website, it appears that only one of 39 programs currently offers such a course, with one other university implementing a conservation psychology course in 2013. Thus 95% of current APAC-accredited programs in Australia do not have a strong focus on training psychology graduates to contribute to addressing these important issues. The need for greater integration of conservation psychology content into undergraduate psychology education in Australia and beyond is discussed.

Keywords: conservation psychology; psychology education; environmental problems

1. Introduction

> "Environmental problems are a function of human behaviors, and human behavioral changes will be necessary in order to address them. Psychology not only is relevant to conservation initiatives, but is among the most relevant disciplines as the one most devoted to the study of human behavior and behavioral intentions" ([1], p. 89).

As is evident from the opening quote to this paper, psychological knowledge and research has much to offer in addressing modern environmental challenges. The purpose of this paper is to illustrate some of the aforementioned challenges and to highlight the importance of providing specific training to students in psychology, regarding how they can apply their skill sets to these global environmental issues. As will be demonstrated throughout the paper, at present, this represents a significant 'gap' in current undergraduate psychology education—at least in Australia—and perhaps also more broadly around the world.

1.1. An Overview of Modern Environmental Challenges

Substantial scientific evidence has emerged in recent times, establishing that climate change is not only happening, but beyond this, is largely attributable to human actions [2]. While the earth's atmospheric temperature has always shown fluctuation, the changes to long term trends in climate currently occurring have been far more rapid than in geological history [3]. Furthermore, such changes to the environment are now widely recognised as posing significant threats to human health and well-being, described by Costello *et al.* as "the biggest global health threat of the 21st century" [4] and by Mapstone as "one of the greatest ecological, economic, and social challenges facing us today" [3].

Since the industrial revolution, humans have significantly altered the earth's atmosphere, particularly through the emission of carbon dioxide (and other "greenhouse gases" such as methane and nitrous oxide, which absorb infrared radiation from the sun, effectively "trapping" this heat in the atmosphere). Today atmospheric carbon dioxide is higher than it has been in at least the last 400,000 years and has increased 50% from pre-industrial levels [5]. These increases are largely the result of human population growth, changed patterns of living and consumption, and the consequent burning of fossil fuels, manufacturing cement, agricultural practices, and clearing the forests which (as well as being the natural habitat of a rich diversity of animal life) also serve as natural carbon stores [6,7]. This, in turn, is influencing temperatures globally, as well as being linked to rising sea levels and an increased frequency of severe weather events [2]. In Australia for example, the average temperature has increased 0.7 °C since 1950. This trend shows no sign of slowing down, with 2000–2009 recorded as the hottest Australian decade and 2010 being one of the hottest individual years ever recorded [8]. These increases pose severe risks of more frequent bushfires, heat waves and droughts. Increasing temperatures are also being documented in the world's oceans, causing expansion of the body of water and melting of the ice-caps, which both contribute to rising sea levels [9]. Such rising sea levels threaten the human and animal inhabitants of coastal locations alike, as these areas will be affected by an increased occurrence of floods and some will over time become uninhabitable [8].

These changes to the global climate will inevitably have direct impacts on human health, including mental health [10]. Severe weather events and flooding may cause injury or death, as well as anxiety,

fear, grief, and post-traumatic stress [10]. Indirect negative impacts on human health have also been predicted through outcomes of the changing climate, such as reduced air quality, greater incidence of mosquito-borne diseases (e.g., malaria or dengue-fever due to climate-induced changes to mosquito populations), reduced crop yields, and decreases in the nutritional content of food (among others; see [11–13]). The significant risk of heat-related deaths for the elderly is also growing, coinciding with changes in temperature patterns and more frequent extreme weather events [11]. Furthermore, forced relocations of individuals who become climate change 'refugees' will have immense psychological implications [14]. These include the loss of a sense of place, home and belonging, as well as disrupted social and cultural relationships. Increased intergroup conflict has also been predicted, since there will be multiple groups of different ethnicities and cultural or religious ideologies competing for the remaining habitable land and resources [10].

Beyond this, human actions are also having immense impacts on other species, which in turn has many negative implications for both human and animal wellbeing. As discussed by Rijksen, "it should not be difficult to understand that every organism of the incredible range of biological diversity on earth needs some space and its own conditions for survival. Such demands are invariably at odds with the interests and aspirations of an ever-growing human population" ([15], pp. 18–19). The magnitude of such human impacts cannot be understated, with earth currently said to be experiencing the sixth mass extinction event in its history. While the last event (an asteroid collision 65 million years ago) sparked the end of the dinosaurs and more than half of the species inhabiting earth at that time; the current event is markedly different. This time it is not a natural disaster of epic proportion, but rather the actions of one species—humans—that is threatening the life of so many other species on earth [16,17].

In 2002, the United Nations Environment Programme [UNEP] forecast that over the next three decades, one in eight bird species and one in four mammals would become extinct. In fact, they suggested a very conservative lower limit is that a species goes extinct every ten minutes [18]. While extinctions are a natural occurrence, it is pertinent to highlight that the current extinction rate has been estimated to be anywhere from 100–1,000x higher than historical levels (e.g., [19]), indicating a significant departure from what would be considered 'normal' and a lack of sustainability in current patterns of human behaviour [20]. This is particularly of concern as it is unclear what the broader impacts will be of human-instigated disruption to ecosystems. One significant health related-possibility is that the loss of key species can unbalance predator-prey numbers within ecosystems, throwing out the delicate balance of nature, which may give rise to plagues or disease outbreaks [21,22]. Motavalli provides the example of a six year drought that was followed by heavy snow and rain, which led to a significant loss of owls, foxes, and snakes that are many of the natural predators of the deer mouse. As a result, the deer mouse population increased 1,000%, leading to a higher probability (and rate) of human exposure to infectious disease spread through their saliva, faeces, and urine, including the life-threatening hantavirus [21]. With the extinction (*i.e.*, permanent loss) of the rich animal life that currently inhabits the planet, there will also be a loss of opportunities to learn from other species and the processes of nature displayed through their evolutionary adaptations. Much insight and technological advancement in human history has been based on biomimicry (or innovation inspired by nature), utilising traits, processes and characteristics which have evolved in different species over billions of years in response to their surroundings. Flying and sonar provide two such examples of

what humans have gained from the observation and study of other species [23]. Furthermore, many advances in modern medicine have stemmed from the rich array of biodiversity on earth. Thus it is hard to comprehend or fully quantify what can/will be lost with the continued rises in animal extinction rates [24]. However, in the face of uncertainty, it seems the precautionary principle must apply, with preventative measures to minimise harm and future losses being the most appropriate course of action [25].

From these examples, it is clear that the current human-instigated changes to the environment, and subsequent impacts on other species, are detrimental to human health and well-being—something psychology as a discipline serves to promote. In fact, the American Psychological Association [APA] has described how the mission of psychology is to advance scientific understandings of human thought, decision-making processes, and actions, and to apply such research findings to the "promotion of health, education, and the public welfare… to benefit society and to improve people's lives" [26]. The APA has also recently passed a resolution, explicitly acknowledging the role of psychology in human-environment relationships and supporting "psychologists' involvement in research, education, and community interventions in improving public understanding of global climate change impacts and psychological contributions to mitigation and adaptation efforts…" [27]. The Australian Psychological Society [APS] has similarly released a position statement on psychology and climate change, and their recommendations are "to assist and encourage psychologists' engagement with climate change issues as researchers, academics, practitioners and students, and to foster the development of national and international collaborations with other individuals and associations inside and outside of psychology" ([28], p. 4). From these leading professional bodies, it is clear a real mandate now exists for psychology professionals to be actively involved in addressing global environmental issues for the promotion of human health—both physical and psychological. This growing recognition coincides with the recent emergence of a new field of enquiry—conservation psychology.

1.2. Conservation Psychology

Conservation psychology has been defined as "the scientific study of the reciprocal relationships between humans and the rest of nature, with a particular focus on how to encourage conservation of the natural world... It is an applied field that uses psychological principles, theories, or methods to understand and solve issues related to human aspects of conservation. It has a strong mission focus in that it is motivated by the need to encourage people to take care of the natural world. In addition to being a field of study, conservation psychology is also the actual network of researchers and practitioners who work together to understand and promote a sustainable and harmonious relationship between people and the natural environment" ([29], p. 138). Specific areas of research interest to the field include: how people care about nature; how they act toward nature; how their beliefs, values, and attitudes toward nature are developed; human connections with nature and other species; human relationships with other people that influence conservation; and how to best promote sustainable behaviour [1,29,30]. Corresponding to the magnitude and diversity of environmental challenges facing humanity at present, the field of conservation psychology spans very broadly, encompassing the study of human-animal and human-nature relationships; significant life experiences in developing environmental

concern; environmental education; and environmental values, norms, attitudes and actions [1,31]. For illustration, some of the key concepts, theories, and research focuses are provided in Table 1.

Table 1. The breadth of conservation psychology and the different facets of psychological study that students may draw upon in addressing global environmental threats.

Thinking about and understanding environmental issues	**Factors shaping behaviour**	**Behavioural action**	**Human-animal and human-nature interactions**
Knowledge about sustainability issues	Values	Selecting target behaviours	The biophilia hypothesis (innate affinity to nature)
Procedural knowledge (to behave sustainably)	Attitudes	Prompts	Preferences for natural environments
Perceptions of risk	Environmental identity development	Goals	Healing or restorative effects of nature and other species
Biases in information processing	Moral responsiveness and functioning/spirituality	Feedback	Health and social effects of companion animals
How people learn	Language and discourse	Reinforcement and reinforcement contingencies	Eco-therapy
Learning environments (*i.e.*, formal and free-choice settings)	Social norms/cultural influence	'Foot in the door' technique	Eco-tourism
Effectiveness of differing communication styles (*i.e.*, fear, emotive, or factual-based)	Emotions	Theory of planned behavior	Zoos, aquariums and managed wildlife experiences
Evaluations of environmental education programs	Perceived behavioural control	Community-based social marketing & identifying barriers	Managing human-animal conflict

In the introductory section of this paper, several key environmental challenges were discussed (e.g., global warming, changed patterns of living and consumption, forest clearing, and human population growth), as well as how these are detrimental to human health and well-being, which bring these within the focus of the discipline of psychology. To change the human behaviours that contribute to these environmental issues, be that use of transport vehicles, electricity, purchasing wood and paper products, a lack of recycling, or eating meat products to name just a few, varied psychological concepts/areas, as presented in Table 1, are relevant. For instance, to design programs to modify electricity consumption behaviour, it is important to consider whether the target group have adequate understanding regarding how electricity use contributes to greenhouse gas emissions and global warming. If insufficient knowledge is deemed to be a barrier to action, psychological theories regarding how people learn (and cognitive psychology more broadly) can be utilised in developing educational materials and programs. These should be mindful of overcoming biases in information processing (e.g., the confirmation bias), as well as ensuring procedural knowledge regarding *how* to

change the behaviour is included—rather than just *why* the behaviour should be changed. Increasing perceptions that the individual can change the behaviour and make a difference (perceived behavioural control) are also important, while theories of persuasion can additionally be utilised in order to facilitate more positive attitudes (a known predictor of actual behaviour, see [32,33]). This includes questions regarding whether peripheral or central route processing is likely to occur (e.g., the elaboration likelihood model [34]), as well as whether emotive and/or factual educational presentations are likely to be most effective [35]. Social psychology can contribute greatly in terms of understanding how the broader social context influences behaviour and how changing perceptions of social norms can facilitate behaviour change. Psychological principles with a behavioural focus can also be implemented, e.g., goal-setting for electricity use targets, prompts around the house or on electronic devices that remind users to reduce consumption as much as possible, feedback regarding their own progress and/or their progress in comparison to others, as well as reinforcement for positive behavioural changes. Plus, of course, the science of psychology and its research methods also have valuable applications in all conservation settings, including how to develop, evaluate, and enhance conservation programs. Thus within conventional psychology programs, there is much scope to illustrate to students how their knowledge base can be applied to contribute to addressing these real-world and significant problems (see discussion for further examples).

While the establishment of the field of conservation psychology is an important step toward psychology making a valuable contribution to addressing issues of overpopulation, overconsumption, and the (un)sustainability of current human actions, it is also important that future psychology professionals/graduates (current students) are well-educated and prepared to enter into this applied field. This sentiment was expressed by Koger and Scott in 2007 [36] and has been echoed in a recent review of the aims, outcomes, and accreditation standards for undergraduate psychology education in Australia, circulated as a green paper for discussion. Here, Cranney and Botwood explicitly recommended that courses/units should be offered in psychology programs that enhance the capacity of psychology graduates to become "globally literate leaders in solving local and global behaviourally based problems", including, but not limited to, climate change interventions and an understanding of relevant environmental decision-making processes ([37], p. 4). Given no data are currently available on this topic, the present paper sought to provide an important initial evaluation regarding the commitment Australian undergraduate psychology programs have made regarding the integration of such conservation psychology content in the training of psychology undergraduates, as reflected in their advertised program information.

2. Methods

To gain an indication of how many universities were currently providing training in relation to applying psychology to real-world conservation issues (consistent with the APA and APS recommendations), an internet search was utilised. The search began by identifying all Australian Psychology Accreditation Council [APAC] approved psychology programs within Australia. APAC is an independent organisation which regulates quality and standards for the education and training of psychology graduates, with a view to creating high-quality programs, with competent graduates who can apply their psychological skills and knowledge to a diverse range of real-world settings [38].

Through the APAC website [38], there is a list of currently accredited courses in Australasia, and from this it was possible to determine all accredited psychology programs within Australia. The search resulted in psychology undergraduate degree programs across 39 higher education institutions being identified (see Table 2 for a full listing of these universities).

The second stage of the process was then to systematically search the website of each identified university, in order to attain detailed information about the content and structure of their psychology program. Such information is publically accessible in order to allow students to make informed decisions about which university provides the program of study most suited to their needs/interests. Once details of the psychology program had been accessed, this was searched for any core (compulsory) or elective psychology courses, with a focus on conservation, sustainability, or environmental issues. Where a course name indicated that it may provide some content in these areas (e.g., social psychology, applied psychology, environmental psychology), individual course information was also accessed (where available). Two primary assessments were made: (1) whether there was an entire course (or unit of study) which focused upon psychology and environmental issues, and (2) if there was not a whole course, was this covered at all as a smaller component of a course in the psychology program? To minimise the chances of missing an aspect of a course which covered conservation psychology or sustainability, the general website for each university was also searched with the terms "conservation" and "sustainability" unit. As noted above, general courses in these areas were not recorded, only those offered with a psychological focus on environmental issues or offered as a component of a psychology program. The internet search was conducted in, and thus program information is current as of, November of 2012.

3. Results and Discussion

The results of the internet search (see Table 2) revealed only one of the 39 universities with APAC accreditation currently offered a course covering this subject matter, namely 'psychology for sustainability' (at the University of New England), with one further university implementing a new 'conservation psychology' course in 2013 (the University of South Australia). At the University of New England, the course focus is on how psychological theory/principles are relevant to understanding and helping to solve diverse environmental issues (e.g., climate change, overpopulation and overconsumption, pollution, and biodiversity loss). The website information describes class discussions, online activities, and an applied project as the main forms of student learning. At the University of South Australia, the course commencing in 2013 will cover an introduction to the field of conservation psychology; the biodiversity crisis; psychological approaches to behaviour change; models of advertising and persuasion; communicating science messages through new media; message framing and presentation; as well as fostering creativity and innovative solutions to these complex issues (note: while this is the home institution of the author, course information has been attained from the same search processes and publically available data as utilised for all APAC accredited Australian universities). Each of these courses is a specialised elective course for second and/or third year students. The other 37 universities (94.9% of all universities in Australia with APAC accreditation) do not list any course offerings in this area. Of these 37, only ten were identified through the internet search as containing some course focus on these environmental issues and the role of psychology

(please see Table 2 for further details). Thus the findings reveal that 69% of universities with an APAC accredited program in psychology, according to their publically available course and program data, do not appear to have made a strong commitment to providing their graduates with any specialised training regarding how psychology is relevant to solving global environmental challenges.

Table 2. Conservation psychology content at APAC accredited universities.

Conservation Psychology Coverage	University
None listed	Curtin University; Murdoch University; Charles Darwin University; Flinders University; Adelaide University; Central Queensland University; Griffith University; University of Southern Queensland; Australian Catholic University; Bond University; Queensland University of Technology; Australian National University; University of Canberra; Charles Sturt University; Macquarie University; University of Newcastle; University of New South Wales; University of Sydney; University of Western Sydney; Australian College of Applied Psychology; La Trobe University; University of Wollongong; Deakin University; Monash University; Swinburne University of Technology; University of Ballarat; University of Melbourne.
Some course content	**University of Western Australia:** Offers a 3rd year course 'psychological science in the modern world: challenges and controversies'. This covers contemporary theoretical debates as they relate to social problems such as climate change, and energy/water conservation. Environmental content is the focus of approximately 1/3rd of the course.
Some course content	**Edith Cowan University:** Lists a 1st year core course 'social determinants of behaviour' covering the application of social psychology principles to applied issues. The applied issues include environmental issues, health issues, legal issues and organisational settings.
Some course content	**University of Queensland:** Lists a 4th year elective course 'applied social psychology' but this was not offered in 2012. The course covers social psychological theory and research in relation to applied issues, including health, law, prejudice, and the environment.
Some course content	**Australian Institute of Psychology:** Offers a 3rd year elective course 'applied social psychological research'. The course covers social psychology as relevant to counselling, sports, media, health, community, and the environment, amongst others.
Some course content	**University of the Sunshine Coast:** Psychology students are required to take 2 of 3 core courses offered in their 1st year. One of these options is 'environment, sustainability, and technology' which provides a general introduction to environmental issues, and consideration of how to better manage human actions and impacts on the environment to achieve sustainability. A core focus is also about teaching students where to access reliable information regarding environmental issues to enhance decision-making.
Some course content	**James Cook University:** Offers a third year elective 'social psychology' which addresses classical social psychology theory as well as behaviour change across applied areas including the environment, health, marketing, and politics.
Some course content	**Southern Cross University:** Offers a 3rd year elective in 'environmental psychology'. The course covers broadly the relationships between people and natural and built environments. This includes some consideration about local ecosystems.

Table 2. *Cont.*

Conservation Psychology Coverage	University
Some course content	**RMIT:** Psychology students are required to complete a core 1st year subject 'sustainability: society and environment'. The course is described as being multi-disciplinary, introducing debates about sustainability at the personal and social level. The course also seeks to encourage students to relate sustainability issues to their own disciplinary area.
Some course content	**Victoria University:** Within the Bachelor of Science (Psychology) program third year elective courses are offered in 'conservation and sustainability' and 'environmental impacts and monitoring'. The former covers concepts and practices for sustaining biological diversity, including balancing these with social and economic needs; while the latter includes consideration of social factors responsible for environmental degradation.
Some course content	**University of Tasmania:** Offers a 2nd year elective in 'community and environmental psychology'. The second part of the course focuses on environmental psychology including leisure and tourism, human-environment interactions, and how psychology can be applied to real-world environmental issues such as managing salinity and water use.
Offers a full course	**University of New England:** 3rd year elective course offered 'psychology for sustainability' (see text for further details).
Offers a full course	**University of South Australia:** 2nd/3rd year elective course offered from 2013 'conservation psychology' (see text for further details). Currently offers a 2nd year course 'biological and learning psychology', which provides some coverage of conservation psychology—in particular the human dimensions of wildlife and habitat conservation.

The findings of this study are significant, as they highlight a marked disconnect between the stated goals of the profession, the calls of leaders in psychology education, and the current state of student training offered through accredited and advertised psychology programs within Australia [26,28,36,37]. Despite specialised courses being frequently offered in topics such as developmental psychology and health psychology, currently 95% of Australian APAC accredited institutions are not offering students a specialised course in the application of psychology to global environmental challenges as part of their professional training. This is true despite the widespread recognition that this is perhaps the greatest challenge facing humanity at present, with significant implications for physical health and psychological wellbeing—issues at the core of the mission of psychology [26]. The gravity of these environmental challenges cannot be understated, with Steffen, Crutzen and McNeill going as far as to refer to human-driven climate change as an "unintended experiment of humankind on its own life support system" ([39], p. 614) and, of course, the life support system for the other 7.77 million animal species thought to be inhabiting earth [40]. Furthermore, only 31% of the universities in this study overall could be confirmed as offering any specific course content addressing these issues (although it must be acknowledged that a possibility exists that some content is covered that is not listed or readily accessible through the university websites). If humans are to reduce their impact on the environment, this must begin with behavioural change (see [41] for further discussion of how conservation means behaviour). Psychology as a profession should be at the forefront of this issue [1], and it is important educators make a commitment to providing the "next

generation" of psychology graduates with more explicit instruction as to how their skill sets can be applied to tackle such challenges.

Where universities were providing instruction in this area, coverage was diverse and illustrative of the broad benefits psychology can have in understanding and facilitating more sustainable relationships between humans and the natural world. This included global applications (e.g., managing climate change and sustainability or the human dimensions of biodiversity conservation), as well as more local applications to issues of regional significance (e.g., managing salinity and water shortages within Australia, the driest continent in the world [42]). Relevant psychological concepts/areas covered also spanned social psychology; education, communication, environmental literacy and decision-making; environmental psychology; leisure and tourism studies; biodiversity conservation and other human/animal interactions; as well as techniques for behaviour modification. The importance of such holistic considerations and the application of psychological concepts, theories, and research to environmental issues can be seen by the following examples, which elaborate on the earlier discussion of modern environmental challenges.

As many environmental challenges stem from human behavioural choices, e.g., population expansion, patterns of consumption, and modern lifestyle expectations, psychology is highly relevant in understanding the factors that shape behavioural action and in designing effective strategies to modify human behaviour for greater sustainability [1,29,30]. Simple behavioural choices such as the level of meat consumed, use of a private vehicle, and purchases of consumer electronics, all influence the 'carbon footprint' or environmental impact an individual has. For example, consumer electronics such as computers, televisions, mobile phones, home entertainment systems and the like contribute to carbon emissions through the energy required to produce and transport them, as well as to run them (*i.e.*, digital and flat-screen televisions, many of which are energy inefficient), and then finally to dispose of these products at the end of their life, or as newer technologies emerge and become available [43–45]. Thus reducing consumer behaviour, and encouraging sustainable design and recycling will be necessary to reduce human impacts on the planet. Many of the areas of psychological study illustrated in Table 1 have great relevance here (e.g., values, norms, and knowledge about sustainability issues). Meat consumption, car ownership, and private travel have also increased markedly in recent times in wealthier countries, further contributing to detrimental environmental outcomes [46]. While the environmental impacts of travel are widely documented and recognised, the role of meat-consumption (and agricultural practices) is perhaps less understood. However, agricultural practices actually account for more of the total greenhouse gas emissions (22%) than the transport sector. In particular, livestock production contributes through land-clearing, the energy and fertilisers used to grow seed grains for feeding livestock, their direct emissions of methane, as well as the energy required to process and transport the resulting meat-products [47]. Thus reduced consumption of meat-products in favour of a greater (or exclusively) plant-based diet (which is associated with less environmentally harmful emissions), or transitions to less environmentally harmful sources of meat (*i.e.*, poultry or pigs rather than sheep or cattle), could help to reduce the environmental impact of human dietary choices and habits [48–50]. Again here, there is a role for psychology in understanding the values, attitudes, education/knowledge, or significant life experiences that underpin a choice to become vegetarian or reduce meat consumption. Lessons for psychology educators can be taken from

how these issues are already being addressed in existing sustainability courses, including the 'Choices for Sustainable Living' discussion course offered through the Northwest Earth Institute.

A certain degree of environmental literacy (*i.e.*, adequate knowledge, attitudes, and skills) is also obviously required to be able to make more sustainable choices. When it comes to information provision to enhance such knowledge however, the picture is rather complex. Monroe explains "while researchers agree that information alone will not motivate someone to adopt a new behavior… it is equally clear that a lack of information can be a barrier to changing behavior" ([51], p. 18). Thus for well-known environmental issues and behaviours such as recycling or (within Australia) conserving water, the impact of information provision may be slight (e.g., [52]), however for biodiversity conservation, a lack of understanding regarding the impacts of human actions on other species or the threatened status of other species may represent a real and significant barrier to conservation action. Psychology can be used in such considerations of how to most effectively increase environmental literacy, e.g., how to best communicate this environmentally-relevant knowledge, in understanding how people learn, and in highlighting some of the information processing difficulties known to exist regarding environmental sustainability and climate change [34,53].

Students at the University of South Australia provide a great illustration of how this sort of foundational training in the application of psychology to biodiversity and conservation issues can foster skill development and interest in further research in this applied field. Building on knowledge developed in the 'Biological and Learning Psychology course' at the University of South Australia, facilitated by Dr Carla Litchfield, several graduate students (Hayley Tindle, Monika Ferguson and Jillian Ryan) and honours students (e.g., Rainer Panoch) are currently working on applied projects, utilising their psychological knowledge to address real-world issues. Examples include applying Community Based Social Marketing methods [54] to identify barriers to reducing shower length and implementing a targeted behavioural intervention in order to reduce shower length/conserve water [HT]; working with zoos to evaluate and enhance captive animal welfare, zoo management, and conservation education practices within zoo/eco-tourism environments[MF, JR]; and designing and assessing the conservation impact of educational and persuasive audio-visual presentations which introduce viewers to issues of human impacts on animal species (e.g., sharks) and can be disseminated widely through the internet and other forms of new media [RP]. These cases illustrate how training in the application of psychology to environmental issues can educate and inspire globally literate psychology professionals of the future—capable of making important contributions to significant behaviourally-based environmental problems around the world.

Despite the obvious applications and apparent benefits, the author recognises one potential barrier to greater integration of conservation psychology content at present is the fact that this is a relatively new field of enquiry, and thus is an area in which many instructors may have had no formal training during their own undergraduate and graduate experiences. For this reason it is important to also draw attention to the wealth of resources available to staff who wish to either develop new courses or integrate more sustainability content into their existing courses. One noteworthy resource is the "Teaching Psychology for Sustainability" website [55] developed by Britain Scott and Sue Koger, which provides a more extensive overview of the relevance of psychology to environmental issues, as well as resources for instructors such as lecture topics, class activities, media content, and examples of course syllabi. The recent special issue on 'Teaching Environmentally Focused Psychology' in the

journal Ecopsychology also highlights how the application of psychology to environmental issues can be integrated into existing undergraduate psychology courses [56], provides examples of relevant assessment [57], and demonstrates the opportunities for action-teaching and problem-based learning at the intersection of psychology and environmental issues (e.g., [58,59]). Special workshops such as the Conservation Psychology Institute [60] or Listservs such as that provided via the Conservation Psychology website [61] also provide opportunities to keep informed of developments in the field, to receive instruction on how to apply psychology to conservation issues, and facilitate networking and the sharing of ideas and practices. Of course, environmental (and many other real-world) problems are inherently complex and interdisciplinary, and therefore there is also great opportunity to learn from colleagues in other disciplines such as ecology, social policy, conservation biology, or environmental science (see [62] for a discussion of strengthening psychology through moving beyond disciplinary boundaries) or even for team-teaching approaches (e.g., [57]). While to date, psychology colleagues from the US have been leading the charge, the findings of this paper suggest there is still some way to go for at least Australian psychology education, and perhaps global psychology education, to more fully realise its potential in tackling these complex environmental issues.

4. Conclusions

In sum, this paper illustrates an important direction for future training of psychology professionals within Australia, with a need for greater integration of the application of psychology to environmental issues within existing courses, or the development of courses which focus exclusively on this problem of global significance. Such training will assist the profession of psychology to grow as a leader in tackling worldwide issues of environmental management and is also consistent with achieving the aims of the profession to foster human health and wellbeing, which are currently being threatened through environmental degradation [10,26]. Although the research was limited to the Australian context, it is also hoped that the paper may stimulate broader interest and discussion from psychology educators across the globe regarding how to increase training to psychology students about applying their knowledge base and skills to environmental issues. Addressing the complex challenges facing humanity at present will undoubtedly require multi-disciplinary and internationally collaborative work; it is important psychology graduates from across the globe—experts in the science of human behaviour—are explicitly taught to make valuable contributions to such collaborations.

Conflict of Interest

The author declares no conflict of interest.

References and Notes

1. Clayton, S.; Brook, A. Can psychology help save the world? A model for conservation psychology. *Anal. Soc. Issues Public Policy* **2005**, *5*, 87–102.
2. Weber, E.U.; Stern, P.C. Public understanding of climate change in the United States. *Am. Psychol.* **2011**, *66*, 315–328.

3. Mapstone, B. Introduction. In *Climate Change: Science and Solutions for Australia*; Cleugh, H., Stafford Smith, M., Battaglia, M., Graham, P., Eds.; CSIRO Publishing: Victoria, Australia, 2011; pp. ix–xii.
4. Costello, A.; Abbas, M.; Allen, A.; Ball, S.; Bell, S.; Bellamy, R.; Friel, S.; Groce, N.; Johnson, A.; Kett, M.; *et al.* Managing the health effects of climate change. *Lancet* **2009**, *373*, 1693–1733.
5. King, D.A. Climate change science: Adapt, mitigate or ignore? *Science* **2004**, *303*, 176–177.
6. Clark, M. Foreward. In *Climate Change: Science and Solutions for Australia*; Cleugh, H., Stafford Smith, M., Battaglia, M., Graham, P., Eds.; CSIRO Publishing: Victoria, Australia, 2011; pp. v–vi.
7. Stern, P.C. Contributions of psychology to limiting climate change. *Am. Psychol.* **2011**, *66*, 303–314.
8. Braganza, K.; Church, J.A. Observations of global and Australian climate. In *Climate Change: Science and Solutions for Australia*; Cleugh, H., Stafford Smith, M., Battaglia, M., Graham, P., Eds.; CSIRO Publishing: Victoria, Australia, 2011; pp. 1–14.
9. Whetton, P. Future Australian climate scenarios. In *Climate Change: Science and Solutions for Australia*; Cleugh, H., Stafford Smith, M., Battaglia, M., Graham, P., Eds.; CSIRO Publishing: Victoria, Australia, 2011; pp. 35–44.
10. Doherty, T.J.; Clayton, S. The psychological impacts of global climate change. *Am. Psychol.* **2011**, *66*, 265–276.
11. Hennessy, K. Climate change impacts. In *Climate Change: Science and Solutions for Australia*; Cleugh, H., Stafford Smith, M., Battaglia, M., Graham, P., Eds.; CSIRO Publishing: Victoria, Australia, 2011; pp. 45–58.
12. Keesing, F.; Belden, L.K.; Daszak, P.; Dobson, A.; Harvell, C.D.; Holt, R.D.; Hudson, P.; Jolles, A.; Jones, K.E.; Mitchell, C.E.; *et al.* Impacts of biodiversity on the emergence and transmission of infectious diseases. *Nature* **2010**, *468*, 647–652.
13. Patz, J.A.; Campbell-Lendrum, D.; Holloway, T.; Foley, J.A. Impact of regional climate change on human health. *Nature* **2005**, *438*, 310–317.
14. Williams, A. Turning the tide: Recognizing climate change refugees in International Law. *Law Policy* **2008**, *30*, 502–529.
15. Rijksen, H.D. The neglected ape? NATO and the imminent extinction of our close relative. In *the Neglected Ape*; Nadler, R., Galdikas, B.M.F., Sheeran, L., Rosen, N.R., Eds.; Plenum Press: New York, NY, USA, 1995; pp. 13–21.
16. Saunders, C.D.; Brook, A.T.; Myers, O.E., Jr. Using psychology to save biodiversity and human well-being. *Conserv. Biol.* **2006**, *20*, 702–705.
17. Sherwood, M. Conservation and environment: Extinction of animals. In *The Encyclopedia of Human-Animal Relationships*; Bekoff, M., Ed.; Greenwood Press: London, UK, 2007; pp. 352–357.
18. United Nations Environment Programme (UNEP). *Global Environment Outlook 3: Past, Present and Future Perspectives*; Earthscan: London, UK, 2002.
19. Pimm, S.L.; Russell, G.J.; Gittleman, J.L.; Brooks, T.M. The future of biodiversity. *Science* **1995**, *269*, 347–350.
20. Watkins, C.; Bock, J. Chimpanzee and human relationships. In *Encyclopedia of Human-Animal Relationships;* Bekoff, M., Ed.; Greenwood Press: London, UK, 2007; pp. 156–163.

21. Motavalli, J. Conservation medicine links human and animal health with the environment. In *The Encyclopedia of Human-Animal Relationships*; Bekoff, M., Ed.; Greenwood Press: London, UK, 2007; pp. 296–308.
22. Samuels, W.E.; Frey, S. Animal conservationists. In *The Encyclopedia of Human-Animal Relationships;* Bekoff, M., Ed.; Greenwood Press: London, UK, 2007; pp. 263–267.
23. Benyus, J.M. Biomimicry: Innovation inspired by nature. In *The Encyclopedia of Human-Animal Relationships;* Bekoff, M., Ed.; Greenwood Press: London, UK, 2007; pp. 110–117.
24. Wilson, E.O. What is nature worth? *Wilson Q.* **2002**, *26*, 20–39.
25. Kriebel, D.; Tickner, J.; Epstein, P.; Lemons, J.; Levins, R.; Loechler, E.L.; Quinn, M.; Rudel, R.; Schettler, T.; Stoto, M. The precautionary principle in environmental science. *Environ Health Perspect* **2001**, *109*, 871–876.
26. American Psychological Association [APA]. About APA 2012. Available online: http://www.apa.org/about/ (accessed on 28 August 2012).
27. APA. Resolution of affirming psychologists' role in addressing global climate change, 2013. Available online: http://www.apa.org/about/policy/climate-change.aspx (accessed on 1 February 2013).
28. Australian Psychological Society [APS]. Psychology and climate change: A position statement prepared for the Australian Psychological Society, 2010. Available online: http://www.psychology.org.au/publications/statements/climate/ (accessed on 28 August 2012).
29. Saunders, C.D. The emerging field of conservation psychology. *Hum. Ecol. Rev.* **2003**, *10*, 137–149.
30. Clayton, S.; Myers, G. *Conservation Psychology: Understanding and Promoting Human Care for Nature*; Blackwell Publishing: West Sussex, UK, 2009.
31. Saunders, C.D. Conservation psychology. In *The Encyclopedia of Human-Animal Relationships;* Bekoff, M, Ed.; Greenwood Press: London, UK, 2007; pp. 308–311.
32. Ajzen, I. The theory of planned behavior. *Organ. Behav. Hum. Decis. Process* **1991**, *50*, 179–211.
33. Armitage, C.J.; Conner, M. Efficacy of the theory of planned behaviour: A meta-analytic review. *Br. J. Soc. Psychol.* **2001**, *40*, 471–499.
34. Petty, R.E.; Cacioppo, J.T. The elaboration likelihood model of persuasion. *Adv. Exp. Soc. Psychol.* **1986**, *19*, 123–205.
35. Pearson, E.L.; Dorrian, J.; Litchfield, C.A. Harnessing visual media in environmental education: Increasing knowledge of orangutan conservation issues and facilitating sustainable behaviour through video presentations. *Environ. Educ. Res.* **2011**, *17*, 751–767.
36. Koger, S.M.; Scott, B.A. Psychology and environmental sustainability: A call for integration. *Teach. Psychol.* **2007**, *34*, 10–18.
37. Cranney, J.; Botwood, L. Review of the Aims, Outcomes and Accreditation Standards for Undergraduate Psychology Education: Green Paper for Discussion. Teaching and Learning in Psychology Interest Group Site, Australian Psychological Society, 2012. Available online: http://www.groups.psychology.org.au/tlpig/ (accessed on 14 July 2012).
38. Australian Psychology Accreditation Council [APAC]. About APAC 2012. Available online: http://www.psychologycouncil.org.au/about/ (accessed on 28 August 2012).
39. Steffen, W.; Crutzen, P.J.; McNeill, J.R. The anthropocene: Are humans now overwhelming the great forces of nature? *Ambio* **2007**, *36*, 614–621.

40. Mora, C.; Tittensor, D.P.; Adl, S.; Simpson, A.G.B.; Worm, B. How many species are there on earth and in the ocean? *PLoS Biol.* **2011**, *9*, 1–8.
41. Wesley Schultz, P. Conservation means behavior. *Conserv. Biol.* **2011**, *25*, 1080–1083.
42. Quiggan, J. Urban water supply in Australia: The option of diverting water from irrigation. *Public Pol.* **2006**, *1*, 14–22.
43. Boardman, B. New directions for household energy efficiency: Evidence from the UK. *Energy Policy* **2004**, *32*, 1921–1933.
44. Crosbie, T. Household energy consumption and consumer electronics: The case of television. *Energy Policy* **2008**, *36*, 2191–2199.
45. Fawcett, T.; Lane, K.; Boardman, B.; Banks, N.; Griffin, H.; Lipp, J.; Schiellerup, P.; Therivel, R.; Blok, K.; van Brummelen, M.; *et al.*, Eds. *Lower Carbon Futures for European Households*; Environmental Change Institute, University of Oxford: Oxford, UK, 2000.
46. Mont, O.; Plepys, A. Sustainable consumption progress: Should we be proud or alarmed? *J. Clean Prod.* **2008**, *16*, 531–537.
47. McMichael, A.J.; Powles, J.W.; Butler, C.D.; Uauy, R. Food, Livestock production energy, Climate change, And health. *Lancet* **2007**, *370*, 55–65.
48. Carlsson-Kanyama, A.; González, A.D. Potential contributions of food consumption patterns to climate change. *Am. J. Clin. Nutr.* **2009**, *89*, 1704S–1709S.
49. Garnett, T. What are the best opportunities for reducing greenhouse gas emissions in the food system (including the food chain)? *Food Policy* **2011**, *36*, 523–532.
50. Rijksen, H.D. The neglected ape? NATO and the imminent extinction of our close relative. In *The Neglected Ape*; Nadler, R., Galdikas, B.M.F., Sheeran, L., Rosen, N., Eds.; Plenum Press: New York, NY, USA, 1995; pp. 13–21.
51. Monroe, M.C. Two avenues for encouraging conservation behaviors. *Res. Hum. Ecol.* **2003**, *10*, 113–125.
52. Vining, J.; Ebreo, A. Emerging theoretical and methodological perspectives on conservation behavior. In *The new handbook of Environmental Psychology*; Bechtel, R., Churchman, A., Eds.; Wiley: New York, NY, USA, 2007; pp. 541–558.
53. Gifford, R. The dragons of inaction: Psychological barriers that limit climate change mitigation and adaptation. *Am. Psychol.* **2011**, *66*, 290–302.
54. McKenzie-Mohr, D. Promoting sustainable behavior: An introduction to community-based social marketing. *J. Soc. Issues* **2000**, *56*, 543–554.
55. Scott, B.A; Koger, S.M. Teaching Psychology for Sustainability Website. Available online: http://www.teachgreenpsych.com (accessed on 7 January 2013).
56. Manning, C.; Amel, E.; Bock, T. Environmental conservation and introductory psychology: A natural partnership. *Ecopsychology* **2012**, *4*, *122–126.*
57. Koenig, A.M.; Reyns, N.B. Assignments integrating psychology and environmental studies. *Ecopsychology* **2012**, *4*, 110–116.
58. Adams, M.; Jordan, M. Taking a problem-based learning approach to teaching ecopsychology. *Ecopsychology* **2012**, *4*, 87–93.
59. Mace, B.L.; Woody, W.D.; Berg, L.A. Teaching environmental psychology by doing it: Explorations in the natural world. *Ecopsychology* **2012**, *4*, 81–86.

60. Antioch University. Conservation Psychology Institute. Available online: http://www.conservationpsychologyinstitute.org/ (accessed on 7 January 2013).
61. Conservation Psychology Network. Conservation Psychology Website. Available online: http://www.conservationpsychology.org/ (accessed 7 January 2013).
62. Pearson, E.; Ranzijn, R.; Goodwin-Smith, I.; Campbell, A.; Hayward, R.; Jackman, G. Strengthening teaching and learning in psychology through looking beyond disciplinary boundaries: A case-study from the University of South Australia. In *Teaching Psychology Around the World*; Karandashev, V., McCarthy, S., Eds.; Cambridge Scholars Publishing: Cambridge, UK, 2012; pp. 55–71.