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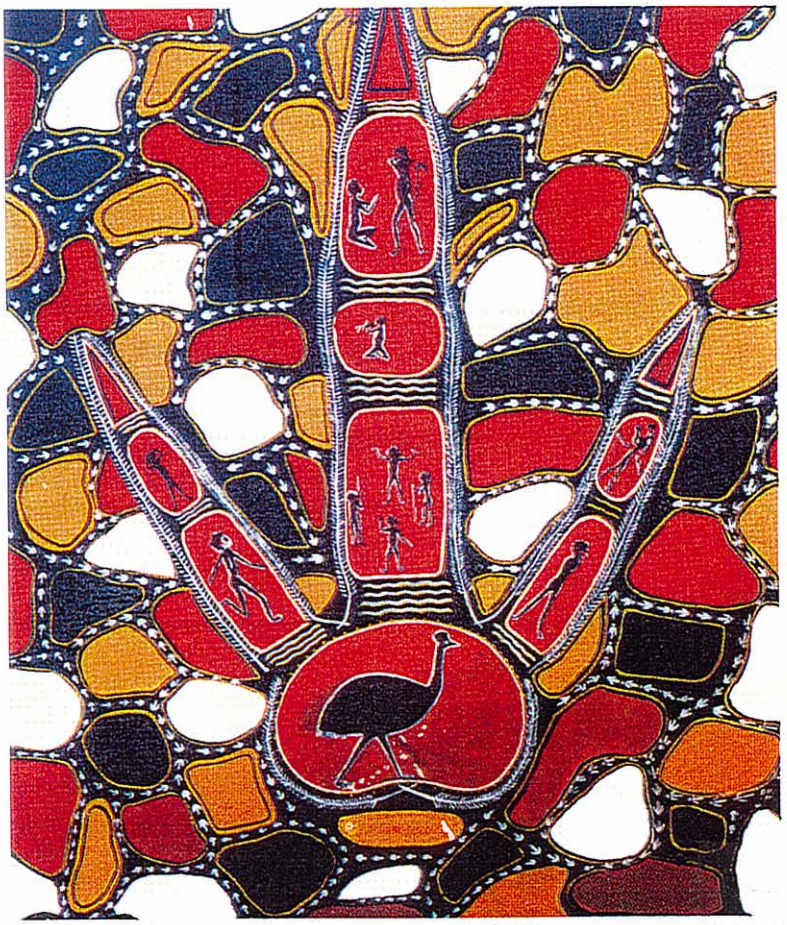
SECTION 4

What does it all Mean?

Integration and Application

Operating at the Human-Natural Environment Interface



Gunduy nyalbanyu, the Cassowary Story
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"There is a Girramay Jujaba story (which non-aborigines might call a dream-time story) which tells how the Cassowary speared so many of the tribe that the people were frightened to go out hunting in case they met him and were attacked. So the Scrub Wallaby, helped by his daughters, cut off the Cassowary's arms as he lay sleeping. After that the Cassowary carried a wuybali spear with his toes. As a result, today all cassowaries have sharp toes which are as dangerous as a spear" (Pedley et al., 1997).

An often stated view of scientists and managers is that management goes on in isolation taking no account of research results and research is largely irrelevant, taking no account of management needs.

A. A. Burbidge, 1994, p.33.

Chapter 16

Links between Cassowaries, Community and Conservation

16.1 Introduction

The impetus for this research was the endangered status of a salient keystone species, the cassowary, *Casuarius casuarius*, and its habitat, the complex forest mosaics of North Queensland, Australia. The encompassing objective which gave particular direction and focus to the research was to undertake a critical review and analysis of the cassowary and human components of the ecosystem and their mutual interrelationships in the context of this rapidly changing region of the world. The implications of such an analysis for the management of this endangered species were also an important research consideration and focus.

Endangered species recovery is clearly a very challenging area of environmental management, with issues of uncertainty, complexity, controversy and urgency all

modifying the process. It is therefore not surprising that many recovery programs have been less than successful or failures in the past (for review see Clark et al., 1994; Yaffee, 1994a). However, it has been these failures and the lessons learned that has driven the search for ways to improve the process, evident in many recent research endeavours (e.g., Reading, 1993) and discussions (e.g., Bennett et al., 1995; Clark et al., 1994; Kellert & Clark, 1991; Stephens & Maxwell, 1996). This research sought guidance from these theoretical, empirical and general discussions.

The main concern highlighted in the literature was a fundamental but persistent obstacle to effective endangered species recovery - the distressingly familiar problem of adequately allotting quality research effort to both biological and human population dimensions of an endangered species recovery process. Accompanying this has been a reluctance in the past to address research problems of diverse and sometimes conflicting studies, limited interdisciplinary communication and collaboration, ineffectual cross-disciplinary integration, and the unwillingness of many scientists to break down the unfortunate dichotomies of "pure" and "applied" research and the "biological" versus the "social" in the environmental research and management arena.

In an attempt to address these issues, this dissertation has situated the research in the broader context of the biological and social science literatures, and theory on the effective environmental management of endangered species, and has examined the relative and unique contributions of biological and human studies to the recovery process. This chapter, which now completes the dissertation, draws on these diverse literatures and analyses for a systematic consideration of where and how environmental management authorities and agencies can more effectively address, monitor and intervene in the recovery of the cassowary, and more generally with respect to conservation of the Wet Tropics in North Queensland, Australia. In so doing it addresses the last of the four principle research aims outlined in Section 1.2.2 (Chapter 1) :

> the integration of the two knowledge bases (cassowary and human) toward the development, implementation, and evaluation of an endangered species recovery program.

This chapter is therefore structured around the concept of integrating the key themes and findings emerging from the two primary studies, together with information derived from the endangered species, environmental management, and social and psychological literatures.

16.2 The Multidisciplinary Approach Revisited

> **Meta-Lesson 1:** *Endangered species conservation is a multifaceted task of interacting biological, professional, sociological, organisational, economic, political, and policy dimensions.* Regardless of the biological status of the species and its habitat, the ultimate causes of most species' endangerment lie in human values that are manifest in varying social, economic, and political institutions and activities. All of these complex "ultimate causes", as well as the biological features of the conservation task, must be integrated into a holistic understanding of the problem that should then receive the interdisciplinary focus of the conservation community. Attempting to restore species by ignoring everything but the species' biology invites failure. Viewing the endangered species crisis from such a holistic perspective demands an interdisciplinary approach.
>
> (Clark et al., 1994, p.419)

16.2.1 Theoretical and Conceptual Frameworks

The search for "new" ways of approaching the management of an endangered species such as the cassowary that were not exclusively biological, led to the discovery of a number of theoretical and conceptual frameworks which highlighted the importance of a holistic view of the process (e.g., Clark, 1996; Clark et al., 1994; Clark et al., 1995a; Kellert, 1994, 1996; Kellert & Clark, 1991; Reading, 1993; Meffe & Carroll, 1994; Stern, 1992a; Yaffee, 1994a, b). These frameworks provided guidance to this research.

While no single framework was adopted in this dissertation, the emergence of a relatively new field of science, conservation biology, which unites traditionally academic disciplines with the applied traditions of environmental management, provided the perspective and rationale for a multidisciplinary approach. Furthermore, conservation biology provided an appropriate and encompassing theoretical framework (Chapter 1, Figure 1.1) because it reflected and articulated this 'new' way of thinking about endangered species management, one which saw the need of a holistic view of the process rather than a reductionist perspective. Finally, conservation biology was an issue-driven science as opposed to discipline-driven, placing an emphasis on real-world issues and accepting that "facts are uncertain, values in dispute, stakes high and decisions urgent" (Funtowicz & Ravetz, 1991). This allowed for a focus on acquiring knowledge to address problems urgently in need of attention.

In addition to the encompassing framework offered by conservation biology, a number of more specific concepts and models which provided an understanding of the critical aspects of endangered species recovery, and the development, implementation and evaluation of an endangered species recovery program, were reviewed. These concepts and models were derived from ecology, environmental and social psychology, and environmental management, and allowed for a more comprehensive and in-depth analysis of the endangered species and human component of the ecosystem and natural-human environment relationships. On the basis of this review it was concluded that in order to understand the process of endangerment and recovery there was the need for integration between disciplines, continuously applying and developing basic ideas in an adaptive learning paradigm (Clark, 1996; Jain, 1992).

16.2.2 The Studies

To achieve this multidisciplinary perspective two independent studies involving two very different sciences (natural and social) were undertaken. The first study focused on the target endangered species, the cassowary, which inhabited the wet tropical ecosystem of North Queensland. The second study addressed the human residents of the same ecosystem.

Study 1 involved a biological investigation of the cassowary, *Casuarius casuarius*, which included population ecology (population size, density, composition and dynamics, social and spatial organisation) and autecology (reproductive behaviour, activity patterns, movement patterns and habitat use). These topics were considered particularly important and prerequisite, firstly, because only very limited information previously existed on these basic aspects of the species, and secondly, knowledge of these topics was essential to developing, implementing, and evaluating any management strategy aimed at preserving the species.

Study 2 presented research findings on the human population characteristics of three communities surveyed, and the respective attitudes, beliefs/values, concerns, and environmental behaviours of these communities. Prior to this analysis, no comprehensive research had been conducted on this aspect of the human component of the North Queensland ecosystem. This is in spite of the fact that cassowaries are endangered because many of the threatening processes acting on them are human-initiated. Aspects of the human component of the ecosystem examined in Study 2 included: (1) individual and community psychosocial considerations (general and specific attitudes, concerns,

information base and behaviour relevant to the natural environment, a range of environmental issues and concerns relating specifically to the cassowary, and shared beliefs/values and ideologies which relate to perceived rights, restrictions, and sanctions, and perceptions of equality, equity, and justice); (2) physical environmental-contextual considerations (landscape features, land use activity, and cassowary habitation); and (3) social-structural constructs which were of particular salience and consequence (demographics and group activity).

16.2.3 Challenges and Strategic Omissions

A challenge of this multidisciplinary approach that was a continuous preoccupation throughout the dissertation was the risk of representing the natural and social sciences in a superficial and too simplistic way. This could lead to much of their substantial theoretical and analytical contribution being overlooked. With this in mind, a considerable effort was made throughout the dissertation to provide as in depth and comprehensive an account of relevant historical and contemporary natural and social science theories as possible. While the task of informing oneself sufficiently in each of these disciplines to provide meaningful input into a recovery process was considerable, I nevertheless believe it was a very worthwhile endeavour. Most importantly, it provided a perspective beyond the boundaries of single disciplines, thereby equipping one with an informed holistic appreciation of the complexity of endangered species recovery. Without this broader vision, there will continue to be a lack of understanding among researchers and managers of the interconnectedness between the biological and social aspects in endangered species recovery which will "constrain(s) problem identification and estimation, and selection of potential solutions to narrow, biologically defined frameworks" (Reading, 1993, p.5).

Other important challenges include the disciplinary divide in terms of paradigms, language, methodologies, and the misrepresentations and understandings of each other, all of which lead to a considerable communication gap between the natural and social sciences. Notwithstanding these differences an attempt has been made throughout this dissertation to present the literature, the studies and the findings in a way that is not only intelligible and useful to readers of differing disciplines and persuasions, but complementary and mutually informative with respect to management issues and challenges. The side by side presentation of the different perspectives throughout the dissertation hopefully highlights important differences, but also critical interdependencies, with respect to endangered species management.

In terms of the immediate needs of endangered species recovery there has also been a strategic omission in this dissertation, the "organisational" perspective (Clark & Reading, 1994; Reading, 1993; Westrum, 1994). However, an empirical study which considers the effectiveness, efficiency, and adequacy of the organisational system used to manage and restore endangered species (Reading, 1993) was beyond the scope of this dissertation. Nevertheless, it is clear that while both the biological and psychosociological studies have provided new and useful insights into these aspects of cassowary management and recovery, the picture will continue to remain incomplete as long as this dimension is not addressed (Clark & Reading, 1994; Reading, 1993; Westrum, 1994) because, "Organisational structure has profound effects on the allocation of tasks and resources, the distribution of information and the overall effectiveness of the program" (Clark & Harvey, 1991). However, a wide range of literature on this topic was reviewed (Chapter 2, Section 2.4) and some direct experience gained through the process of this research. Together these sources of information have enabled some general statements to be made about the organisational dimension of cassowary recovery.

16.3 Toward Developing, Implementing and Evaluating an Endangered Species Recovery

A specific model which outlines a systematic process for endangered species recovery is the policy process model (Chapter 2, Section 2.4.2.4) developed by Brewer and de Leon (in Brewer & Clark, 1994). This model has been incorporated into a number of recovery paradigms (e.g., Kellert, 1994, 1996; Kellert & Clark, 1991) and identifies several stages through which a recovery process must proceed (Brewer & Clark, 1994; Clark et al., 1995b). Estimation, selection, implementation and evaluation are key stages, each involving multidisciplinary perspectives critical to the process as a whole. An important aspect of this model is that, rather than being considered a linear process from basic research to intervention, feedback and thereby learning continuously informs the process.

In this final chapter, this model provides a logical and pragmatic way of integrating key issues which emerge from the two studies undertaken. Addressing these issues in the context of the development, implementation and evaluation of endangered species recovery frames them in the following way. Firstly, information on the biology of cassowaries and the psychosociology of the resident community which is critical to the development stage is summarised. Secondly, information arising out of both of these

studies which has important implications for the implementation of the recovery process is examined. And thirdly, any findings that are particularly relevant to the process of evaluation are discussed.

16.3.1 Developing a Recovery Effort

16.3.1.1 Basic Biological Information on Cassowaries

Compared to other terrestrial vertebrates in the wet tropics rainforest (e.g., musky-rat kangaroo, *Hypsiprymnodon moschatus,* Dennis, 1997), cassowaries are long-lived, occur at fairly low densities (Chapter 6, Table 6.7) and have large area requirements (Chapter 6, Table 6.8) consisting of complex habitat mosaics (Chapter 8, Figure 8.11). In addition, cassowaries are primarily frugivorous, consuming fruit available on the forest floor (Chapter 8, Section 8.3.2.2). They also require regular access to water (Chapter 8, Table 8.4). Such basic requirements leaves them particularly vulnerable to any changes in the environment (Noss, 1991; Pimms, 1991). Furthermore, because adult cassowaries are solitary and territorial with stable home ranges (Chapter 6, Section 6.3.2.2), any loss, degradation, and/or other incursion of their home range is likely to result in the loss of cassowaries. This also has important implications should translocation of adult birds be considered as a management option in situations of "problem" or "at risk" birds (Chapter 9, Section 9.2.2).

Cassowaries are not capable of a rapid reproductive effort. Substantial male parental investment (Chapter 7, Figure 7.1), low chick survivorship (Chapter 7, Figure 7.3), and low annual productivity (Chapter 7, Section 7.3.6.1), means that cassowaries are unable to re-establish a devastated local population after a major disaster, natural or unnatural, or to rapidly recolonise an area from which a population has been eliminated. This is because the rate at which a population recovers from a decline depends in part on the species' reproductive rate (Pimms, 1991). Sustainability therefore requires a broad habitat which can ensure that natural disasters such as cyclones cannot threaten an entire population. Furthermore, cassowary populations contain a larger proportion of adults to subadults and chicks. Any alteration of the age structure will lower reproductive output and slow population recovery. Another factor that acts against the cassowaries is their long-deferred maturity. This means that, after a decline in population, it may take many years for numbers to recover.

While this study of cassowaries has provided an important insight into the biology of the species, this has only been the first step in establishing an "understanding" of the species and the species' survival requirements. Considerable research is still required.

16.3.1.2 Psychosociological Information of the Community

A widespread and genuinely pro-environmental stance characterised this North Queensland community sample, as evidenced in respondents' positive evaluation of cassowaries and 'other' wildlife (Chapter 12), their pro-environmental world view (Chapter 13), and their concern for the well being of cassowaries and the natural environment in general (Chapter 14). In addition, the majority of respondents considered themselves to be environmentalists (Chapter 14). Despite this strong pro-environmental stance, tensions between the need to conserve and the need to exploit emerged, placing the majority of respondents in the "environmental sympathiser" position (Chapter 13, Figure 13.7); that is, this is a community which supports an ecocentric view, but which also holds aspirations for economic growth and future prosperity as well as wanting to limit government interference (Milbrath, 1995). Factors which appeared to erode the pro-environmental stance in this community sample were private property rights, economic growth, material abundance (Chapter 13, Section 13.5.1.2) and concern about own economic and life style well being (Chapter 14, Section 14.4.2).

A positive emotional connection to the natural environment, including cassowaries (Chapter 12, Section, 12.4.1.1) and "other" wildlife (Chapter 12, Section 12.4.2.1), was widespread in the community samples. Furthermore, this emotional connection was strongly associated with environmental activity (Chapter 15, Section 15.2.1). Overall, respondents' environmental information base was of a medium level (Chapter 12, Section 12.4.3.1). However, rural and semiurban respondents were better informed about cassowaries and "other" wildlife than urban respondents (Chapter 12, Figure 12.10). In addition, respondents who were well informed about cassowaries were also engaged in various activities linked to protecting the species (Chapter 15, Section 15.2.1).

Concern for the well being of cassowaries also emerged as a significant issue for this North Queensland population sample (Chapter 14, Section 14.4.1). Most respondents were aware that the survival of cassowaries was at risk and that a number of human-impact factors, particularly habitat loss, were responsible. Their considered appraisal of the possible extinction of cassowaries closely aligned with the judgement of the natural scientists, that is, that cassowaries are endangered. However, anthropocentric concerns

which dealt with issues such as economic and lifestyle consequences of protecting cassowaries (restrictions, regulations, property rights) appeared as potential barriers to the translation of ecocentric concern to support for action. Although a minority, those respondents most concerned about their economic/lifestyle well being were the ones who would not acknowledge that the survival of cassowaries was at risk. As well, they would not accept that habitat loss was associated with a decline in cassowary numbers.

16.3.2 Implementing a Recovery Effort

Many researchers involved in environmental management and in particular endangered species recovery (e.g., Clark et al., 1994; Kellert, 1996) have consistently highlighted the notion that managing the environment or a particular species primarily involves managing people. The results from this research clearly support this notion. Major changes in the ecological setting of cassowaries are due to humans (Chapter 15, Sections 9.4.1 & 9.4.2). This has resulted in a contact history between cassowary and human populations that corresponds to high mortality for cassowaries (Chapter 6, Section 6.3.1.5). Furthermore, the social structure and territorial nature of adult birds, their need to regularly access fruit and water, their movement patterns, and the need for subadults to disperse from natal areas, suggests they will not, in the long-term, adapt to situations that substantially impact on these fundamental requirements.

While cassowaries are found throughout the region, sometimes in regular contact with the human population, and apparently readily adapting to the provision of supplementary food and water (pers. obs.), such situations often leave these birds very vulnerable to attack by dogs, death on the roads (Chapter 6, Table 6.5), and occasionally a public which demands the removal of a so-called "problem" bird. Clearly, this "adaptive" ability of cassowaries may be beneficial in the short-term, but a fatal attraction in the long-term.

16.3.2.1 Implications of the Pro-environmental Stance

In light of the findings from Study 2 it was evident that, in general, environmental management agencies have a strong public support base amongst this North Queensland population sample. This is critical to the implementation of policies, programs and strategies in any recovery effort (Wondolleck et al., 1994). Although such data do not tell managers what to do, it does give an indication of where the public stands with respect to specific environmental issues, providing information about the level and nature of public

support (Heberlein, 1989). Lack of attention to public support has been found to be a key reason for the poor performance of recovery efforts in the past (Culbert & Blair, 1989, in Tear et al., 1995).

Public support evidenced in this research was not restricted to a particular issue nor to one psychological domain. Rather, it existed for both the endangered cassowary and the environment in general, and was evident in the attitudinal, belief/values, and concern profiles of this North Queensland population sample. Wondolleck et al. (1994) point out the critical need for such support.

> Without such support, even the best-intentioned conservation strategies will fail: dying a quiet death on a recovery team's shelf, languishing in administrative appeals, political delays, or court challenges, or simply failing to deal with the full set of issues that contribute to the endangered species problem at hand. (p.306)

In viewing this widespread pro-environmental stance as indicative of individuals and a community ready to support and motivated to assist in the preservation of cassowaries and the environment in general, the emphasis on managing people shifts somewhat from changing where this community is at in terms of environmental issues, to providing the means by which this community can participate more effectively in the conservation process. The focus, therefore, should be on the management agencies themselves and how they work with this highly motivated community in order to prevent the extinction of a species. This does not negate the value of the research findings in terms of their contribution to understanding how change can be brought about and maintained. This contribution to environmental management in general will be addressed later. However, the management task first becomes one of facilitating informed involvement and responsible behaviour, and reducing barriers to ecologically responsible behaviour and land management.

16.3.2.2 Critical Elements of Participation

This research identified a number of elements critical to encouraging the participation of members in these North Queensland communities in the protection of the environment.

Working *with* the community To start with, good management depends of an accurate assessment of public understandings and concerns

regarding the environment and its protection. Assessments based on managers' own perceptions have been found in the past to be more characteristic of their own values and predispositions than realistic perceptions of the public's actual opinions and reactions (Vining, 1992). As evident from the findings of this research, the need to counter the negative evaluation respondents have of government interference requires an emphasis on working *with* rather than working in isolation of the community. Management strategies that involve such collaboration or partnerships are now widely discussed, particularly in environmental management and conservation biology theory (e.g., Beatley, 1994; Meffe & Carroll, 1994; McMullin & Nielsen, 1991; Selin & Chavez, 1995). Strategies that involve collaborative negotiation and decision making have also been widely applied (see for example, Western & Wright, 1994). It has become clear that the traditional decision-making process that is hierarchal in nature and unilateral in direction is no longer satisfactory (Selin & Chavez, 1995; Wondolleck et al., 1994). For those managers most comfortable with this traditional approach, the switch to collaboration will indeed be difficult.

An emphasis on the individual as well as the 'group' With the need for a collaborative model well established theoretically and empirically, the real challenge for management agencies now begins; that is, in identifying how this can be achieved. As Selin and Chavez (1995) point out, "Understanding those underlying forces that both facilitate and inhibit collaboration in environmental settings should be the first step toward designing new forms of public participation in resource policy decision making"(p.194). Despite the emphasis on public involvement, all who discuss the strategy add that it does not eliminate controversy, but rather reflects the complexity of endangered species conservation (McMullin & Nielsen, 1991; Wondolleck et al., 1994). However, the application of community development, organisational and management theory as well as theoretical perspectives from social psychology, particularly in relation to group dynamics, facilitating effective change, and conflict resolution, is well suited to understanding and facilitating this process.

In attempting to overcome an important obstacle to equitable collaboration one of the most fundamental needs is to address the issue of the stakeholder, perhaps the most vexing issue in the collaborative process (Reser et al., 1996). The findings from this research suggest that everyone is potentially a stakeholder. Therefore, restricting collaboration to an advisory group which consist of individuals chosen from a number of community groups runs the risk of failing to address the interests of a 'silent' majority who do not belong to any particular group, thus setting up a potential conflict area. For example, despite their pro-environmental stance, many respondents were very antagonistic toward

'conservation groups' and resented the way they presented many issues as being as though they reflected a majority or consensual conservation view or a community consensus.

> *I feel there are enough people beating the environmental drum - the danger is alienating the general population rather than motivating them towards supporting the general thrust of conservation* (a 45 year old male, urban respondent).

In addition, it is not unusual that particular types of people are over-represented in an advisory group. Through the very process of the collaborative effort, the advisory group members may drift away from representativeness, with advisory group members becoming less representative over time of their individual interest groups (McMullin & Nielsen, 1991). On the other hand, a very important factor in the disproportionate representation of vested interest groups is the way in which 'community consultation' takes place. A meeting is advertised, very few people - relatively speaking - attend. Those who do attend are typically people who are more vocal, with vested interests, and with particular agendas. This natural 'selectivity bias' means that one must often qualify and question the 'community' character of the recommendations from such groups.

With collaboration implying power sharing, conflict reduction, shared responsibility, and a shared vision for the future, failing to adequately address a majority view obviously has its limitations. As Wondolleck et al. (1994) and many others (e.g., Clark et al., 1994; Yaffee, 1994a) argue, failing to deal with all of the issues of concern will result in a failed management strategy. On the other hand, approaches that integrate the needs of all can reduce the severity of conflict, engendering greater support for environmental protection (Opotow, 1994). Advisory groups should therefore be used only as part of a larger public involvement program (McMullin & Nielsen, 1991), rather than as representative of the public view. A suggestion as to how to overcome the logistics of broadening public representation in a collaborative strategy while at the same time reaching a more representative public is the use of simple but well-structured survey research. As McMullin & Nielsen (1991) point out, "properly designed and administered surveys may induce some of the "silent majority" to participate" (p.91).

The strength of the collaborative model depends in part upon keeping its issues and proposals within a framework of broadly shared human concerns. Only by bringing together a diverse, pluralistic constituency can environmental managers maximise their

impact on local environmental destiny. It would be a mistake to assume that such a constituency automatically exists within the framework of advisory groups.

Need for best practice On the other hand, while there clearly is the need for individual and group involvement in management itself, concern has also been expressed about management decisions being driven solely by community consultation and politicised 'surveys' to the exclusion of expert advice from ecosystem specialists and human behaviour specialists (Reser et al., 1996). In addition, often management abnegation of responsibility has masqueraded as 'community involvement'. What is sorely needed is best practice and pragmatic professional wisdom in 'community' consultation, the assessment of 'community' representations and understandings of the environment and management issues, and in the analysis and use of research findings from natural and human environments in environmental management and decision-making.

16.3.2.3 Importance of Emotions

Among the many issues relevant to preserving biodiversity, the public's emotional connection to the natural environment is particularly important, having a number of potentially significant implications for environmental managers and the implementation of management strategies. Firstly, such a connection emphasises the importance of utilising emotional content in strategies used to enhance the public's positive evaluation and appraisal of the natural environment rather than relying on the transmission of ecological information alone (Bragg, 1995; Fien, 1993; Orr, 1994). This would include various information dissemination strategies such as formal and informal education programs, design and use of signage, pamphlets, brochures, and all other forms of communication with the public. As the research findings imply, to foster public support for preserving a particular species or environment there is the need to provide information and visual images that elicit feelings, positive emotion-laden attitudes and concerns that tend to be persistently retained. Giving prominent attention to the biophilic properties of the environment will, according to Ulrich (1993), be more successful in promoting public appreciation of these environments than exposing people to fear-relevant stimuli such as snakes, creepy-crawly creatures, etc. As Ulrich (1993, p.119) points out, "In light of the research suggesting a robust genetic role in biophobia, even well-conceived education programs may achieve only limited success in fostering public appreciation of certain risk-relevant properties and living things in the rain forest because of the difficulty in overcoming a biologically prepared disposition to respond negatively." On the other

hand, Ulrich suggests that in order to produce strong emotion-saturated attitudes against destructive activity, it is appropriate to portray the consequences of destroying rainforest in a vivid but accurate manner.

Both Fien (1993) and Orr (1994), have also proposed models of environmental education which "foster(s) innate biophilia and the analytical abilities and practical skills for a world that takes life seriously" (Orr, 1994, p.148). In both of their models the emphasis is placed on a type of experiential learning that is not restricted to facts and concepts, nor to just experiencing nature. Rather, it is based on engaging people in the active resolution of environmental questions, issues, and problems, which involves a wide range of "knowledge, skills, values, and participation objectives" (Fien, 1993; Keen, 1991; Orr, 1994).

Secondly, an acknowledgment of the public's emotional connection with the natural environment emphasises the need for managers to be aware of the role emotion will potentially play in any public involvement in decision-making processes such as those involving collaboration strategies discussed previously. Although it is generally argued that "most managers view emotionality as superfluous to their professional role of rational resolvers of problems, and see emotion as a source of bias in public responses" (Vining, 1992, p.7), there is no longer any place for this view in a collaborative management strategy. Emotions do exist. They are an integral part of individuals' and communities' responses to and appraisal of environmental issues and environmental quality, and constitute an important though difficult problem for managers. They therefore can no longer be considered inadmissible to planning and management. In fact, the question of whether emotion ought to be eliminated from decision processes has been challenged by recent research and theory that has proposed a rational and functional role for emotion (Lazarus, 1991; Ulrich, 1993; Vining, 1992). In the context of environmental management, Vining (1992) identifies the informational, motivational, and communicative functions of emotions as being particularly relevant. For example, public emotions may serve an *informational* function that could predispose individuals to react to situations in certain ways which in this research may facilitate a positive evaluation of management strategies aimed at endangered species recovery. On the other hand, emotions can play a role in *motivating* political and other support for reducing the destruction of nature and the extinction of species. Finally, emotion can be used as an important *communicative* resource because simply listening to (and really hearing) individual and community emotional views is an important first step to both understanding and conflict resolution (Vining, 1992). The research on equity, perceived justice, and 'rights' issues strongly emphasises the importance and intensity of feelings,

and it is the emotional content and dynamic of conflict resolution that is most important and consequential for successful mediation (Deridder & Tripathi, 1992; Lerner, 1970; Nash, 1989; Opotow & Clayton, 1994; Stone, 1972; Walster et al., 1978).

16.3.2.4 The 'Rights' Issue

Another noteworthy finding from this research, one that has direct implications for endangered species recovery, was the general lack of support for privileging private property rights over environmental well being (Chapter 13, Figure 13.2). This was a particularly important result because views on property rights are considered to "profoundly influence responses to proposals designed to protect the environment" (Dodds, 1994, p.47). In addition, species become endangered largely because of habitat loss (Caughley & Gunn, 1996; Dobson, 1996; Meffe & Carroll, 1994). The response of rural respondents was particularly salient as they represent the largest landholders and therefore are the group most likely to be affected by proposals that restrict land use activity. The findings suggest that these respondents do not support property rights in an uncritical or absolute way (Chapter 13, Figure 13.4). Management agencies, therefore, have a vital group within the North Queensland community essentially accepting the possibility, logic and need for restrictions on land use activity for the sake of preserving the endangered cassowary.

Nevertheless, understanding the public view on issues such as perceived rights, restrictions, sanctions, perceived threats, and economic/lifestyle well being remains a fundamentally important consideration in the implementation of management programs. The reality is that the cassowary, which is a large terrestrial vertebrate, uses a wide range of landscape, much of it outside the legal protection of reserve system. Its survival is most likely to depend on continued access to these areas. Under these circumstances, the 'rights' issues is a central concern and has to be addressed as both cassowaries and landowners are in need of the resources the landscape has to provide (Dodds, 1994; Kellert & Clark, 1991; Meffe & Carroll, 1994).

In general, the perceived infringement of basic rights is a salient, emotional, and all-determining equity issue in community responses to management, policies and government control. In addition to the issue of property rights, there are a number of other 'rights' that management agencies have to consider. Urban expansion, for example, highlights a different set of issues as well as the primary issue of habitat modification (Beatley, 1992; Bosakowski et al., 1993; Dowd, 1992). Many issues are associated with

individual rights such as domestic animal control, road expansion and traffic speed, supplementary and hand feeding of wildlife. Tourism adds another dimension to the rights issue (Burger & Gochfeld, 1993; Norton & Roper-Lindsay, 1992; Scherl, 1991; Valentine & Cassells, 1991). With the ever-increasing expansion of this industry into the area of 'ecotourism', considerable pressure is mounting on access to the reserve lands. However, perhaps the least acknowledged sector of the public are those whose interest lies in just knowing that the natural environment and its inhabitant species are being preserved, the vicarious users (Reser et al., 1996). Their rights must also be considered.

Finally, scientists, managers and conservationists have often resorted to utilitarian arguments for conservation of an endangered species or ecosystem; that is, conservation of a species or ecosystem will provide new and more resources for now and the future, new possibilities for tourism. Ecological reasons are also put forth to further support this argument; that is, ecosystems provide "life-support" services - oxygen, clean air and clean water, the necessary seed dispersal of species such as the cassowary. Some argue on the basis of aesthetic reasons such as the enjoyment of wilderness. However, all of these arguments present only an anthropocentric perspective. As Jain (1992) asks, "What about ethical reasons?" that is, other organisms have a right to exist; it is morally wrong to kill or destroy.

> We need to argue about wisdom as much as knowledge, ethics as much as technology, and transpersonal or deep ecology as much as the value-free ecological science. Science is useful for discovering and knowing but not for choosing and making value judgements. (Jain, 1992, p.479)

16.3.2.5 Organisational Constraints

Because endangered species recovery policy and program implementation is "largely determined by government bureaucracies" (Brewer & Clark, 1994), some account of organisational constraints to implementation is warranted in this concluding chapter. However, because of a lack of empirical evidence on the organisational dimension of cassowary recovery (see Section 16.2.3), this account must necessarily be viewed as a subjective assessment; one based on circumstantial evidence[1] but supported by a substantial literature now available on the subject (Chapter 2, Section 2.4).

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[1] My continued involvement in cassowary research and conservation since 1986 has resulted is a close liaison with the management agencies, Department of Environment and Wet Tropics Management Authority. My research findings and advice have always been given freely to them.

Firstly, circumstantial evidence suggests that in the decision-making context of cassowary recovery, organisational performance is being compromised because clear and consistent operational goals have not yet been established. In addition, communication between the different levels of the organisational hierarchy appears to be lacking. A likely consequence of this is that 'goals' established by the high level decision makers will not be embraced by those in the field or will be interpreted differently (Reading, 1993). Alternatively, input from the real-world of field management and hence experienced staff is at minimum being undervalued, and at maximum being totally ignored. This has led to considerable conflict among management organisation staff, resulting in frustration, resentment and loss of commitment.

Secondly, the issue of power and authority appears to dominate relationships between key actors in decision making, such that gaining control or at least dominating the management process becomes the primary goal. A suggested consequence of this is that endangered species recovery goals may be displaced, becoming secondary to various power agendas (Reading & Miller, 1994). In addition, dominant personalities can emerge which will result in the exclusion of many who have very valuable contributions to make (Miller et al., 1994). Such struggles for control of management will clearly reduce the efficiency and effectiveness of the effort (Reading & Miller, 1994).

Thirdly, there appears to be a strong link between problem recognition and public pressure on cassowary issues, rather than management organisations taking the initiative or heeding the warnings of scientists. Miller et al. (1994) suggests that this 'crisis management' scenario, which is a considerable consumer of resources, is less likely to be successful. In addition, this apparent organisational reluctance for problem recognition, formulation and action prior to public pressure, can lead to public criticism about the ability and certainty of organisational decision making (Clark et al., 1989; Miller et al., 1994).

Fourthly, parochial politics in the form of local political, economic and cultural pressures appear, in some instances, to override long-term biological and social consequences. Interest groups concerned with parochial issues can impede the implementation because they often dominate the management process by their direct influence through recovery teams, and local political and management organisations. In fact, many in management organisations appear to be intimidated by the power of such interest groups. This can result in the exclusion of a broader (Backhouse et al., 1994), and professionally informed perspectives in line with long term and sustainable management outcomes.

A fifth element is that management agencies are largely staffed by public service personnel who may not have requisite biological or social science expertise. While consultant advice may be sought for biological issues, rarely is expertise sought or thought necessary for issues relating to people and communities. Rather, the reality of widespread 'conventional wisdom' and 'lay understandings' of why people behave the way they do is confused and confounded with social science and research-based understandings of the complex factors and processes that mediate human experiences and behaviour. As well such organisations tend to be unduly driven by political considerations such that their mission statements drift toward appeasement and political expediency particularly with regard to the interest groups rather than conservation and sustainable management.

These five issues highlight the main organisational constraints observed during my involvement in cassowary research and conservation. Until a detailed analysis of the organisational dimension of cassowary management is undertaken, they are of course a matter of impression and personal opinion, albeit enjoying reasonable consensus among environmental researchers (e.g., Clark, et al., 1994; Miller et al., 1994; Reading, 1993).

16.3.3 Evaluation: Measuring and Monitoring

Evaluation (review, appraisal) is critical to defining success or failure of programs and policies (Backhouse et al., 1996; Clark, 1996; Oskamp, 1995; Posavac & Carey, 1997). In an endangered species recovery effort, evaluation is seen as the basis for identifying and rapidly tackling problems. It therefore has to be ongoing, continuously feeding information back into the program so as to "learn from experience, identify lessons and to continually improve performance" (Backhouse et al., 1996). In addition, any evaluation of endangered species recovery programs has to address both biological and social factors (Backhouse et al., 1996; Clark, 1996). Measuring and monitoring are key tools in an evaluation process.

A starting point for effective evaluation is to establish baseline data against which comparisons can be made and outcomes and "success" measured. Based on research findings from Studies 1 and 2, this discussion provides insights into measuring and monitoring considerations that need to be addressed in order to achieve a systematic and scientifically rigorous approach to evaluation.

16.3.3.1 Biological Assessment

The evaluative criteria of success of an endangered species recovery effort is at minimum the maintenance of existing populations, at maximum, an increase in the population level, and number and distribution of populations (Caughley & Gunn, 1996). Spatial and temporal comparisons of various demographic parameters such as numbers, density, survival rates and productivity, against firm baseline data (Colbert & Lebreton, 1991), are fundamental to evaluation. Methods of estimating population size, and thereby population density and presence-absence, are usually the first considerations of applied research because it is this baseline information that managers use to establish the status of the species and its distribution. In addition, from this information managers can identify trends in status over time and in space. Furthermore, changing a species' listing and designating a species as "recovered" depends on this information (Mace & Lande, 1991). It is therefore important for managers to have access to methods of estimating population parameters of cassowaries that work well and can be used consistently over time and across space. If a reliable and valid approach is not established very early on, any subsequent assessment of these parameters can be relatively meaningless and evaluation tenuous at best.

In any biological assessment, techniques have to be developed that account for various biological and behavioural characteristics of the species as well as maintaining statistical validity. This study has identified a number of important biological considerations that must be taken into account when estimating population size and associated parameters. Firstly, it is important to realise that, in order to evaluate population parameters, quick and easy methods will not be sufficient. Secondly, this study identified that the use of dropping (scat) counts to estimate population size or even presence-absence of cassowaries is inaccurate. Variation in food abundance at different times of the year (Dennis, 1997), number of species available (Appendix A.4.1), and movement patterns associated with seasonality of food supply (Chapter 8, Figure 8.10), means that for the same number of cassowaries scat density varies in any one area at different times of the year. The variable gut retention times (Chapter 8, Table 8.1) and detection rates of scats (Chapter 8, Figure 8.6), reflect this annual, monthly and area variation in food supply. Secondly, it is not possible to draw definitive conclusions from the absence of direct or indirect indices. Low numbers or total absence can be reported for forests when they are devoid of fruit, because, in the nonbreeding season, cassowary movements are associated with food acquisition. An approach that places a heavy emphasis on simple tallies of the number of animals present or the inferred absence of a species on presence-absence data does not account for movement patterns and variable use of different sections of the home

range (see Harris & Silva-Lopez, 1992). Any census technique used must therefore consider these important behavioural and ecological factors.

Thirdly, an important consideration when measuring and monitoring cassowary populations is the notion that degradation can be a slow transformation from optimal to unsuitable conditions. Because of long lag times between critical levels of habitat degradation and any detectable change in population size, monitoring population sizes to gauge effects of habitat degradation, no matter how rigorous, will be inadequate (Doak, 1995). More effective measures may therefore be population density changes in particular habitat types, or change in specific demographic rates. Clearly, a short-term, one-off, population census will not adequately account for long time-lags which may accompany population declines, annual variations in population levels due to seasonality of food, the inevitably of missing birds, and movement patterns.

Finally, in further support of the notion of long lag-times, Jarman (1996) cautions against making judgements about the success or failure of a recovery program based on formulas such as distribution and/or abundance of the target species in a specified and usually short time. There are many important insights from ecological theory to suggest that in such a highly dynamic system as the natural environment, populations will always increase and decrease in response to various limiting factors and that it is only after considerable time that a meaningful assessment can be made.

16.3.3.2 Psychological Assessment

The specification and measurement of constructs in social science disciplines has often been inconsistent, and in part reflects the absence of widely used and consensually agreed upon theoretical frameworks and construct definitions. The confusing diversity of models, levels of analysis, and variable definition is compounded by a frequent lack of specificity and precision with respect to operational and measurement procedures. This theoretical and methodological 'looseness' particularly characterises social science type research in the environmental domain, often undertaken by researchers who have not been trained as social or behavioural scientists. On the other hand, most social and behavioural scientists are sensitised to and indeed preoccupied with psychometric and theoretical issues relating to the reliability, validity, utility and ultimate meaningfulness of their measures and operationalisations of constructs. What is needed is for research to be accurate, reliable, representative and useful. Survey research has its own high standards

and requirements for representative, accurate, bias-free, and meaningful research (de Vaus, 1985; Kerlinger, 1986; Sarantakos, 1993).

In line with the overall assessment from the literature, this research concludes that attitudes about particular aspects and issues relating to the natural environment constitute an important construct for understanding the interrelationship between people and the natural environment. Attitudes are directly related to the judgements people make about environmental perceptions, priorities, impact, and quality. As underlying predispositions to behaviour, they are also of central importance to ultimate human impact. In addition, attitudes are particularly relevant to evaluation research, allowing for the measurement of change over time. The most significant aspect of attitude in the present research was the emotional component. It played a key role in understanding people's representations of the natural environment and predicting environmental activity. This type of attitudinal information provides valuable feedback that helps improve any program that affects the public in some way or requires public involvement. While it is difficult often times to change behaviour, changing specific attitudes which are linked to behaviour provides environmental managers with specific and more realistic intervention targets and outcome indicators.

The use of the Dominant Social Paradigm (DSP) and the New Environmental Paradigm (NEP) as measures of shared belief systems and value orientations also provided valuable insights into community representations and understandings of the natural environment. The results from this study clearly documented the existence of a coherent set of beliefs and value orientations or *shared* understandings in the communities surveyed. It was also clear that the DSP and the NEP measured two distinct domains of environmental belief systems and value orientations, one a reflection of past assumptions and understandings (DSP), the other the presence of a new ecological awareness (NEP). Both paradigms were co-existing and contemporary - not mutually exclusive - sets of beliefs and values concerning the natural environment and the nature and extent of human rights and responsibilities.

Concern about environmental matters and issues was particularly useful for measuring individual and community representations and understandings of the natural environment. Lay perspectives and judgements of environmental risk measured as environmental concern were important indicators of ecosystem well being as well as a politically astute signal for the environmental manager interested in community perceptions. Measures of environmental concern also allowed the researcher to access and quantify how people represent the natural environment to themselves and others. This confers a certain

ecological validity in that it relates to how people see and understand their everyday natural environment. Environmental concern is not an abstracted, 'experience-far' (Geertz, 1983) construct that derives from a particular theory. Rather, it is a practical, 'experience-near' construct which accommodates cognitions, feelings and motivations and relates directly to individual and shared experience as well as the decision-making of environmental managers.

16.3.3.3 The Cassowary: a 'Miner's Canary' of Ecosystem Well Being

Both the biological and psychological assessment of cassowaries suggests that this species may well be regarded as a 'miner's canary' - a species which provides some indication of the well being of the wet tropical ecosystem as well as being an important symbol of a viable and functioning natural ecosystem.

The Biological Perspective As the cassowary is a species which is endangered, long-lived, predominantly dependent on a substantial variety of fruits throughout the year, and requiring large home range areas of intact complex habitat mosaics, any decline of cassowaries can be clearly linked to changes in the functioning of the natural ecosystem. The most significant of these is habitat loss and degradation, with which are associated many threatening processes. The role of cassowaries as dispersers of large seeded fruits (Jones & Crome, 1993) further emphasises the ecological significance of this species in the wet tropical ecosystem. Considering their biological characteristics and ecological role, cassowaries may be referred to as "umbrella", "flagship" and "keystone" species (Noss, 1991). This suggests that the preservation of cassowaries ensures the preservation of an ecosystem and many other species; alternatively, their loss means the loss of a diverse and complex system.

The Psychological Perspective People living in the natural environment are sensitive observers of changes and impacts, often focusing in on particular barometers of negative impact. The well being of the cassowary appears to be one of these features, and perceptions here clearly influence perceived environmental quality. The present research findings suggest that the cassowary is being used as a touchstone with respect to how things are in general and the status of the natural environment. This is an important part of the symbolic character and importance of the cassowary and its use as a barometer by people in general. Threats to the cassowary are threats to the environment and ultimately threats to human life support systems.

16.3.3.4 Environmental Concern: an Indicator of Ecosystem Well Being

In the Natural Science Domain Environmental concern is understood by many as a generic concern about the well being of the biosphere - the physical, natural, non-human environment. This fits well with a natural science perspective where the emphasis is on measuring and monitoring the physical 'well being' of the environment - ecosystem 'health', 'integrity'. Biodiversity loss, ecosystem degradation, wasted and polluted landscapes etc., constitute the kind of physical, observable manifestations of impact used by natural scientists to evaluate and assess this well being (e.g., Fairweather, 1993; Underwood, 1992). The choice of biological indicator variables used to measure ecosystem well being varies, but includes the usual empirical measures of species richness, diversity, and distribution (Keough & Quinn, 1991; Chapter 6, Table 6.7). Despite considerable effort on the part of natural scientists, a clearly defined natural science model for conceptualising, understanding, and measuring ecosystem health is still absent (see for example, Ehrenfeld, 1992; readings in Woodley et al., 1993.). Many continue to question the quality and rigour of the scientific method in such an assessment and indeed the very concept of ecosystem health (e.g., Haskell et al., 1992; Reid, 1994). But in the highly complex, real and variable world of the environment, it is understandably difficult to come up with an appropriate model or even an appropriate concept. Furthermore, any such assessment is ultimately, inherently, and quintessentially a matter of human analysis and appraisal (Constanza et al., 1992; Reser et al., 1996).

A relatively new discipline, conservation biology, has evolved out of the 'concern' natural scientists have had for the biodiversity crisis (Chapter 1). In this area of natural science, terms such as 'crisis discipline', 'risk assessment', and 'decision analysis' indicate an underlying concern that is driving the development of new theories and methodologies needed if natural scientists are to make a worthwhile contribution to solving the environmental crisis. To the natural scientist, extinctions and endangerment are dramatic physical indicators of negative, unsustainable anthropogenic impact on our great storehouse of flora and fauna (Beatley, 1994).

In the Social Science Domain The psychological state of 'concern' which motivates natural scientists toward measuring and monitoring the well being of the biosphere is a type of environmental concern that is of particular interest to the social scientist. The difference between the two scientific approaches lies in where scientists focus their attention. Social scientists are primarily interested in measuring concern as it

is represented and understood within the psychological context of the individual and community (Chapter 14). Social scientists recognise that the concern that people express for the well being of the natural environment is in part a reflection of the fact that they see the human environment and human life support systems as being simultaneously threatened as a consequence of the state of their environment (Chapter 14, Section 14.4.2 and 14.4.4). However, another aspect of concern that people express for the well being of the natural environment is that which includes concern about the environment for its 'own sake', that is, specific concerns about the well being of and threats to particular species (Chapter 14, Sections 14.4.1 and 14.4.3)

In the Environmental Management Domain Concern about the well being of the natural environment is also assumed to be a 'concern' of environmental managers. Human activities which negatively impact on the natural environment reflect an aspect of this environmental concern which appears on logical grounds to be a particularly salient and important consideration to environmental managers. However, an additional consideration which is central to the environmental management perspective is the human stakeholders. The language of managers and planners is characterised by much reference to stakeholders, costs, users and values (e.g., Beder, 1993). Such language, and the assumptions underlying such language, frame issues of environmental concern rather differently to that of the natural scientist and to some social scientists. These are clearly 'concerns' about the economic and lifestyle impact of possible change, or the consequences of existing courses of management action, on those with a particular vested interest in an environment or activity in question (Chapter 14, Sections 14.4.2 and 14.4.4). While such concerns are critical to environmental management decision making and policy formulation, these concerns have the potential to privilege particular people and particular settings (Reser et al., 1996). Although these are legitimate concerns which have to be acknowledged and understood, they must nevertheless be situated within an environmental management framework that considers all stakeholders in both the human and natural environment domain.

In the Public Domain 'Concerns' and environmental concern are also everyday expressions in daily interactions and conversations. Their use acknowledges a lay understanding that particular *concerns* say something about where an individual or a community is at in terms of preoccupations, priorities and perceived problems. The lay or popular culture perspective on environmental concern would appear to be one characterised by high salience, uncertainty and perceived risk, but limited knowledge and understanding. Environmental concern in this forum is essentially *caring* about the natural environment, and *worrying* about environmental degradation and irreversible loss.

Language is, however, used loosely, and environmental concern can include any concerns that relate to the natural or human-made environment, such that many of these concerns are really about human welfare and impact, economic and individual freedom and lifestyle costs (Chapter 14, Sections 14.4.2 and 14.4.4), as distinct from specific concern or concerns about the local or global natural environment (Chapter 14, Sections 14.4.1 and 14.4.3). It is important to appreciate that individual and community *understandings* about the environment are both couched in terms of concerns and mediate experienced concern. What is needed is a more careful, systematic and useful taxonomy and consensus with respect to the spectrum of environmental concerns that drive the environmental management process, the research enterprise, and individual and community behaviour. Somehow the plight of the cassowary has epitimised and given symbolic expression to these multiple concerns.

16.4 Concluding Comments

Through the considerable efforts of a number of researchers (see for example, Bennett et al., 1995; Clark et al., 1994; Stephens & Maxwell, 1996), many endangered species recovery programs now cease to be disciplinary exclusive initiatives, based on biology alone. Instead, management is moving toward the understanding that to 'manage' effectively and successfully requires the sum of many interrelated and integrated activities and 'parts', all of which contribute to the sustainability and maintenance of biological diversity. Nevertheless, this realisation has not brought with it any easy solutions. How well managers now succeed in embedding the conservation of an endangered species such as the cassowary in daily individual, community and agency practices depends on how well they understand and use the information now available on the target species itself, the human population on which the survival of this species depends, and their intertwined destinies and reciprocal impact.

There is no survivor, there is no future, there is no life to be recreated in this form again. We are looking upon the uttermost finality which can be written, glimpsing the darkness which will not know another ray of light. We are in touch with the reality of extinction.

Henry B. Hough in Day, 1981.

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Abbreviations

ABRS	Australian Biological Resources Study
ANOVA	Analysis of Variance
APA	American Psychological Association
CITES	Convention of International Trade in Endangered Species
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DOE	Department of Environment
DNR	Department of Natural Resources
DSP	Dominant Social Paradigm
ESA	Endangered Species Act
FAO	Food and Agriculture Organisation
IBP	International Biological Program
ISC	Interagency Spotted Owl Scientific Committee
IUCN	International Union for the Conservation of Nature
JCU	James Cook University
KTBA	Known To Be Alive
MAB	Man And the Biosphere
NEP	New Environmental Paradigm
UN	United Nations
UNCED	United Nations Conference on Environmental Development
UNESCO	United Nations Educational Scientific and Cultural Organisation
USA	United States of America
WTMA	Wet Tropics Management Authority
WTWHA	Wet Tropics World Heritage Area

APPENDIX A: STUDY 1

Appendix A.1.1: Profile of the Cassowary, Dillenia.

CASSOWARY IDENTIKIT

Observer

Name: *J.M.Bentrupperbäumer* Date: *24.1.1990*

General Information

Identity : *Dillenia*

Sex : *Male*

Age Category : *Adult*

Location Details

1. *Kennedy Bay National Park*
   Zone A & D
2. *Tam O'Shanter Property*

General Notes

Dillenia has a number of unique characteristics which make his identification very easy. Most obvious are the indentations across the top of his casque and a secondary lobe on the inner side of his right wattle. This secondary lobe appears to be an inherited characteristic rather than due to a physical injury. His overall size, build and the long tail feathers are consistent with male characteristics.
Dillenia is the first cassowary I attempt to habituate and from the beginning he appears to be fairly cooperative. His breeding interactions are with the females, Jasminum and Kamala and his chicks include:Alata, Boronia(1990); and Cowleyana, Daemeliana (1992).

Physical Characteristics

Feathers:

Colour	*Black*
Condition	*Good*
Tail Length	≅ *20 cm*

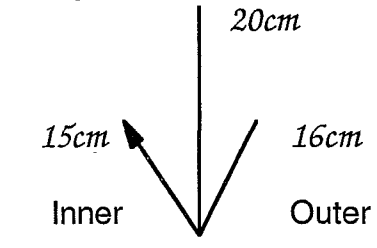
Quills:

No. Right	*3*
No. Left	*2*

Other Notes: *Body - medium build*

Legs: *No Markings*

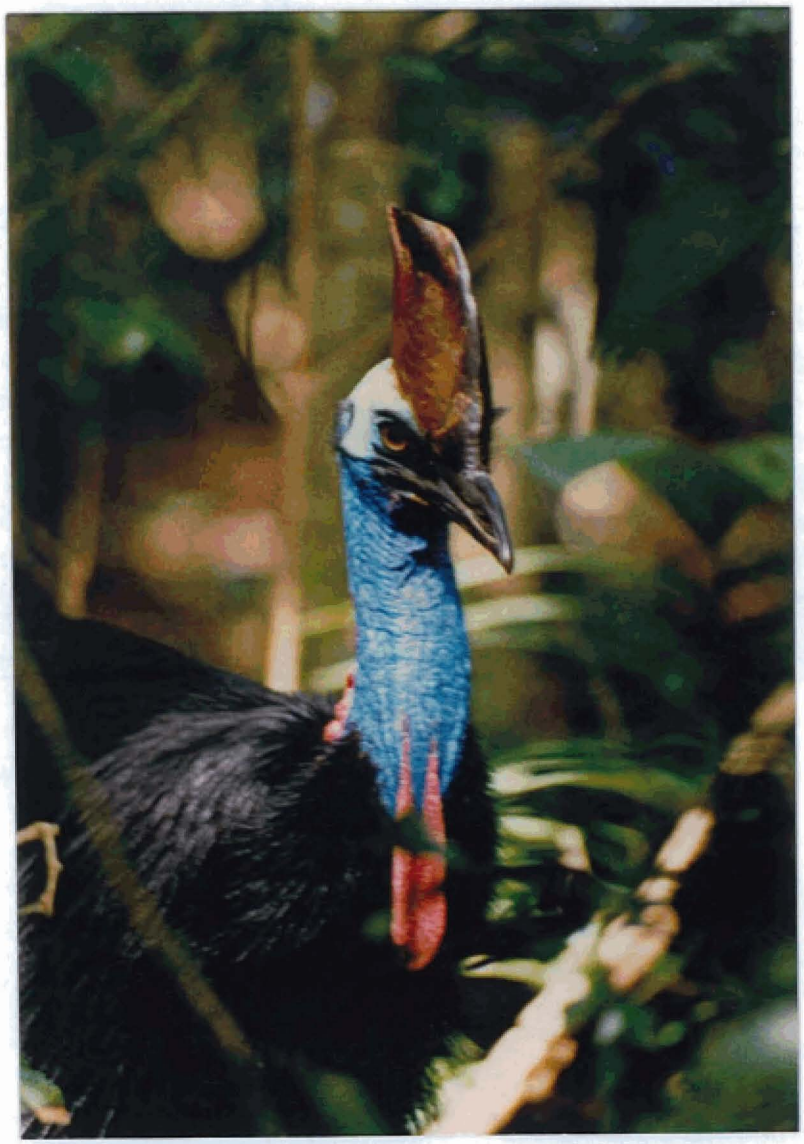
Footprint:



Appendix A.1.1 (Cont....)

Cassowary Identikit: Adult Category

Identity: *Dillenia*



Appendix A.1.1 (Cont....)

Cassowary Identikit: Adult Category

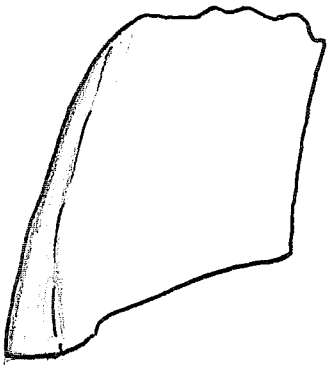
Identity: *Dillenia*

Cassowary Identikit: Adult Category

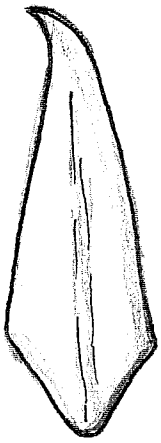
Identity : *Dillenia*

Casque: Size *Medium/Large*

Indentations *Back section of casque*



Tilt *Top of casque and to the right*



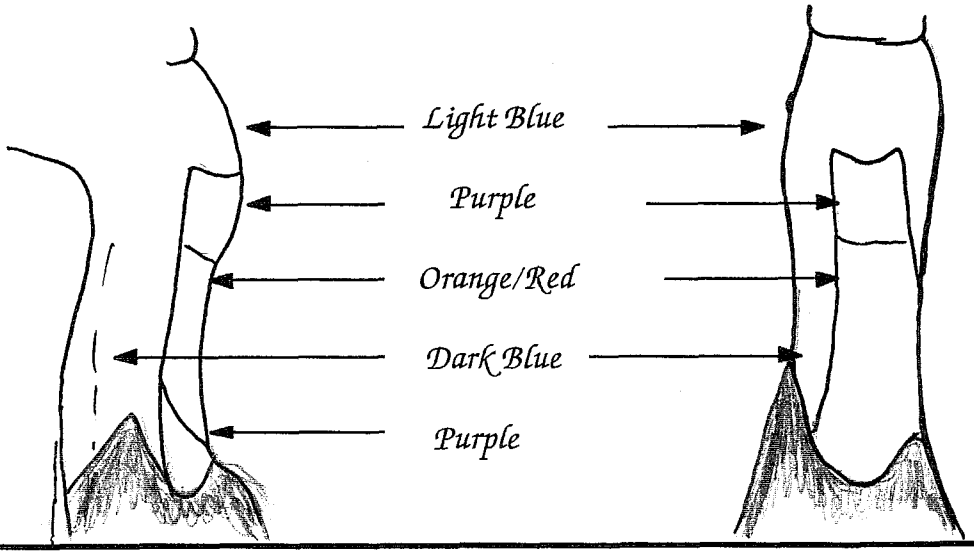
Wattles: Size *Medium/Large*

Colour *Red*

Right Left

Neck: (Colour Patterns)

Side Back



Appendix A.2.1: Cassowary Monitoring Program Data Sheet.

CASSOWARY MONITORING PROGRAM

DATA SHEET FOR RECORDING CASSOWARY SIGHTINGS

Date of Sighting	Time of Sighting	Sighting/ Age Category	Location	Details	Informer
Example: 21.2.90	08.30	1 Adult with 3 young chicks	Lacey Ck.; El Arish-Mission Beach road	Birds crossing road from north to south	B. Smith 070 666 666

Age Category: (1) adult = black feathers, full casque & wattles; (2) subadult = independent bird, brown feathers, poorly developed casque & wattles; (3) old chick = with adult; brown feathers; (4) young chick = with adult; yellow & black striped feathers.

Return to : J. Bentrupperbäumer, PO Box 52, MISSION BEACH, 4852. (Ph. 070 688 565).

Appendix A.2.2: Sighting Records of Resident Cassowaries of the Kennedy Bay National Park.

IDENTITY	1990												1991											1992						
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	N	D	F	M	J	J	S	O	N
ADULTS																														
Males																														
Acmena	2	5	-	1	-	-	1	2	-	-	-	1	-	-	-	1	1	-	-	-	-	1	-	-	1	9	6	2	1	-
Dillenia	1	9	11	3	21	9	6	10	6	2	4	4	11	6	-	1	7	-	6	2	3	-	-	1	-	5	-	1	2	1
Ficus	-	2	3	3	-	-	9	5	5	3	3	-	3	2	-	1	1	1	-	-	-	-	-	-	-	-	2	1	-	-
Gunduy	1	2	2	-	-	-	-	1	2	-	-	-	1	-	-	1	-	-	-	-	1	-	-	1	-	-	3	-	-	-
Myristica	1	-	-	1	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Neolitsea	see *SUB Neolitsea*												-	-	-	-	-	-	-	-	-	-	-	1	-	2	3	-	3	1
Females																														
Bowenia	1	5	-	2	-	1	-	1	-	-	-	1	1	-	-	-	2	1	2	-	-	1	-	1	-	2	2	1	1	-
Eugenia	1	1	6	1	3	1	7	4	5	2	1	1	5	1	3	5	1	1	-	2	1	1	2	1	-	1	1	1	-	-
Helica	-	-	-	-	2	-	1	-	-	1	-	-	-	8	-	-	-	1	-	1	-	-	-	-	-	-	2	-	-	-
Intsia	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	4	-
Jasminum	-	-	-	-	11	9	4	1	-	2	2	3	1	1	1	-	1	-	4	2	2	5	3	1	-	1	1	-	-	-
Kamala	-	-	-	-	3	2	-	-	-	1	1	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-	1
Sex Unknown																														
Leea Indica	-	-	-	-	-	1	1	-	3	-	-	-	2	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
Cordyline	see *SUB Cordyline*												-	-	-	-	-	2	-	1	-	1	-	-	-	-	-	-	-	-
Unidentified	6	6	1	1	3	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-
SUBADULTS																														
SUB 1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SUB 2	2	5	2	-	-	-	-	1	1	-	3	-	1	-	-	-	-	-	-	-	-	2	-	1	-	-	-	-	-	-
SUB Cordyline	1	-	2	6	10	3	-	1	1	1	2	-	see *Cordyline*											see *Cordyline*						
SUB Neolitsea	2	3	2	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	see *Neolitsea*						
SUB Australis				1	-	3	-	-	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SUBBrachyandra				1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SUBClaviflorum				1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SUB Albipil	see *Albipila* (Ficus's chick)												-	-	-	-	1	2	-	-	-	-	-	-	-	-	-	-	-	-
SUB Acacia	see *Acacia* (Gunduy's chick)												-	-	-	1	-	1	1	-	-	-	-	-		1	1	-	-	-
SUB Bubbia	see *Bubbia* (Gunduy's chick)												-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SUB Caryota	see *Caryota* (Gunduy's chick)												-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SUB Insipida	see *Insipida* (Myristica's chick)												1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SUB Alata	*see Alata* (Dillenia's chick)																		4	-	1	-	-	-	-	-	-	-	1	-
Unidentified	1	1	-	1	-	-	-	-	-	-	-	-	-	1	-	1	-	-	4	1	2	-	1	1	-	3	2	1	1	3
	1990												1991											1992						

Appendix A.2.2 (Cont.....)

	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	N	D	F	M	J	J	S	O	N
CHICKS																														
Acmena's:																														
Australis	2	4	-				see *SUB Australis*						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Brachyandra	2	4	-				see *SUB Brachyandra*						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Claviflorum	2	4	-				see *SUB Claviflorum*						-	-	-	-	-	-	-	-	-	-	-							
Graveolens	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	9	6	2	1	-
Hemilampra	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	9	6	2	1	-
Dillenia's:																														
Alata	-	-	-	-	-	-	-	7	6	2	4	4	11	6	-	1	7	-	see *SUB Alata*					see *SUB Alata*						
Boronia	-	-	-	-	-	-	-	7	6	2	4	4	11	6	-	1	7	-	D	-	-	-	-	-	-	-	-	-	-	-
Cowleyana	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	5	-	2	2	1
Daemeliana	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	5	-	2	2	1
Ficus's:																														
Albipila	-	2	3	3	-	-	9	5	5	3	3	-	3	2	-	1	see *SUB Albipila*							-	-	-	-	-	-	-
Benjamina	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Congesta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Destruens	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Gunduy's:																														
Acacia	-	-	-	-	-	-	-	1	2	-	-	-	1	-	-	see *SUB Acacia*								-	-	-	-	-	-	-
Bubbia	-	-	-	-	-	-	-	1	2	-	-	-	1	-	-	see *SUB Bubbia*								-	-	-	-	-	-	-
Caryota	-	-	-	-	-	-	-	1	2	-	-	-	1	-	-	see *SUB Caryota*								-	-	-	-	-	-	-
Myristica's:																														
Insipida	1	-	-	1	-	1	-	-	-	-	-	-	*see SUB Insipida*											-	-	-	-	-	-	-
Neolitsea's:																														
Brassii	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
Delbata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-

Appendix A.2.3: Photographic Record of Cassowary Deaths and Injuries.

Plate 6.8 Young adult cassowary hit and injured by a vehicle.

Plate 6.9 Adult cassowary killed by a car.

Appendix A.2.3 (Cont.....)

Plate 6.10 Adult cassowary killed by dogs.

Plate 6.11 Wound on the body of an adult cassowary caused by dogs.

Appendix A.2.3 (Cont.....)

Plate 6.12 Severe injuries to a subadult cassowary's feet caused by wire.

Plate 6.13 Detail of injuries.

Appendix A.2.3 (Cont.....)

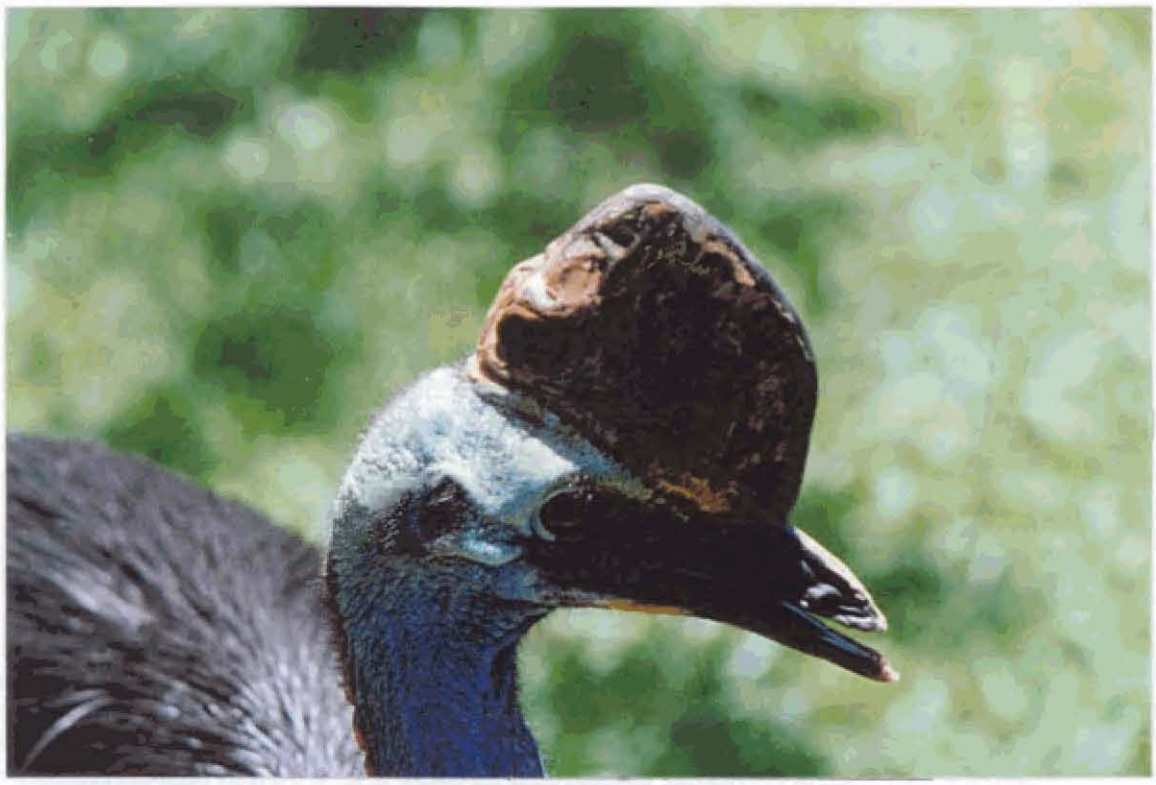


Plate 6.14 Injury to a cassowary's beak caused by wire fences.

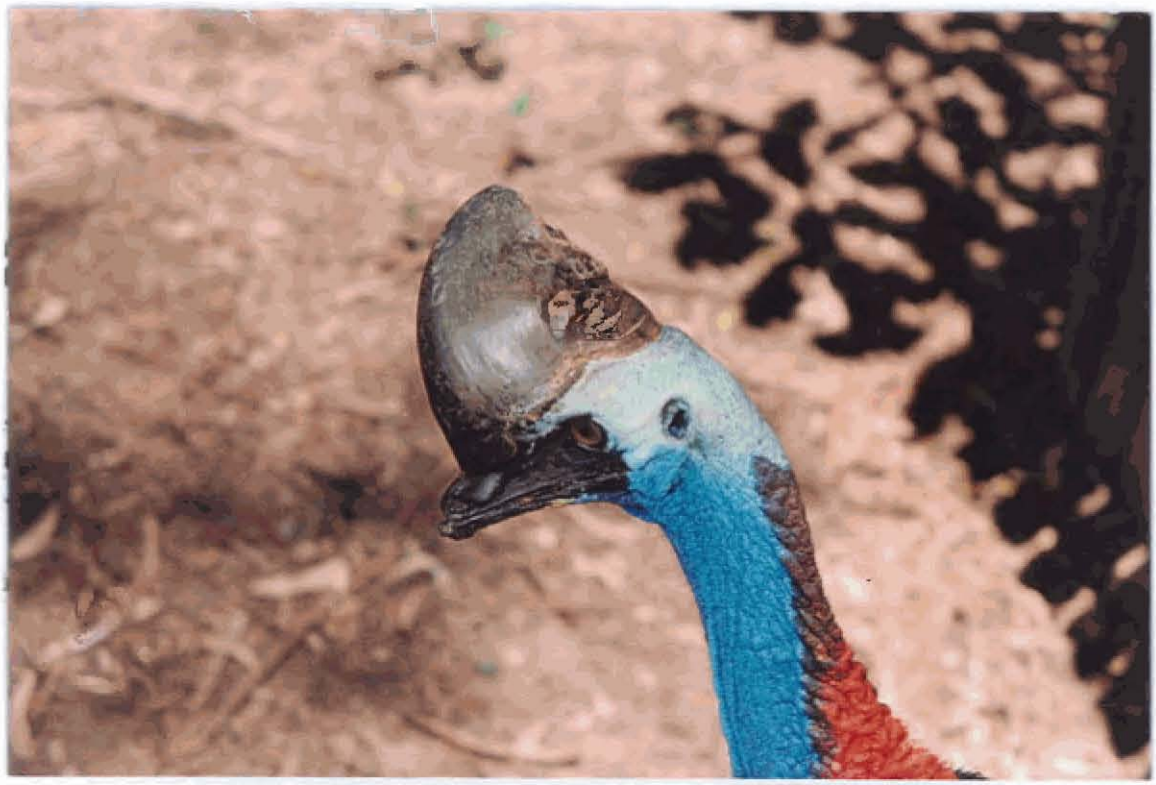


Plate 6.16 Injury to beak and casque caused by wire fences.

Appendix A.2.4: Brief Description of the Cassowary's Vocal Repertoire.

I recorded a total of 723 vocalisation bouts[1] during this study. In the normal course of the day when no direct interactions with conspecifics were observed, solitary adult cassowaries vocalised rarely (0.24 calls per hour of observation, n = 211 hours). In contrast during two periods of direct interactions between an adult and subadult, vocalisation frequency reached 16.4 vocal bouts per hour, with intervals between vocalisations ranging from 1 to 50 mins (mean ± SD = 7.1 ± 11.7 mins). Although I did not tape record vocalisations, detailed written notes of vocal behaviour including descriptions of the call, the birds' posture and the circumstances of the vocal bout formed the basis of my description of the cassowary's vocal repertoire. From this information I was able to identify eight discernible sounds which fitted into four categories according to the main format of the vocalisation. I describe the physical aspects, structure, context, and possible function of these vocalisations.

Boom This is perhaps the most unusual but impressive of cassowary vocalisations particularly because of the time taken and physical effort involved in its production. To produce this vocalisation, the adult cassowary lowers and at the same time stretches its head and neck forward while in a standing position. With its beak slightly open it slowly inhales, gradually inflating its neck and in turn air sacs to full capacity. During this inhaling period, which lasts for at least 5 to 10 seconds, no sound is heard. Toward the end of inhalation it slowly withdraws its head and neck toward its body. At this point it suddenly exhales the air audibly through its fully open mouth. The amount of air inhaled is obviously determined by body size, which in turn determines intensity and types of sound emitted. Subadults lack the body size required to produce the depth and intensity of the call produced by adults.

I identified three different boom calls. The first was a very long and deep continuous *rumble* boom which was normally emitted only once or twice in a vocal bout. All air inhaled was assumed to have been exhaled in order to make the call. *Rumble* booms were rarely heard (n = 12) and appeared to be associated with breeding activity. In this context it is suggested to function as a long-distance contact or advertisement call, communicating availability, location and perhaps even identity. For example, all but two of these calls were made by females and provoked an immediate response from the male. He would either immediately walk toward the call or present a full stretch display and then walk toward the call.

The second was a *long* boom, a slightly shorter and less intense version of the *rumble* boom. It was the most frequently used call, accounting for 49.4% of all vocalisations heard. In one vocal bout of the *long* boom, 4.3 calls per bout (± 1.5 SD, n = 360) were produced. This was the average number of *long* booms that were emitted from one inhalation. The *long* boom bouts lasted between 5 and 15 seconds). Although this call was used in at least three different contexts, in general, it appeared to function as a notification of presence and warning of aggressive intent. As such it could be considered as a territorial marker. In an environment where visibility is rarely greater than 30m this was valuable information. *Long* booms appeared to be most often used when another bird was perceived to be in the area [2]. The *long* boom was also used in situations of conflict particularly agonistic encounters between females during which vocalisation was a very important aspect of the display (see Section 6.3.2.3). In this context it may have been

[1] A vocal bout is defined as the period during which one particular vocalisation event takes place.

[2] On a number of occasions a bird would vocalise in this way in response to my presence.

Appendix A.2.4 (Cont.....)

used to communicate size and strength and thereby the intent to avoid aggressive contact. And finally, *long* booms were used to communicate an impending approach, that is, to notify of an intent to approach another bird, particularly during breeding. In this context it would also function as a means of avoiding conflict, as well as assisting in individual recognition.

In the third boom call, the *short* boom, successive short calls were emitted, average 4.1 calls per vocal bout (± 1.7 SD, n = 83). While this is the same frequency as the long boom, a *short* boom bout was considerably shorter (3 to 5 seconds). This type of vocalisation was used less frequently than the *long* boom, accounting for 11.5% of all vocalisations. Again it appeared to be emitted when sensing the presence of myself or another bird, which may be communicating mild distress together with threatening lightly.

Grunt The cassowary's grunt accounted for 18.5% of all vocalisations heard. It was a low-pitched clear sound reminiscent of that of a pig. Grunts did not require the physical effort involved in producing the boom vocalisations. Instead it could be emitted instantaneously by forcing air from the chest into the throat and against a closed mouth. The grunt vocalisation pattern consisted of two discernible calls, a *discrete* and *continuous* grunt. The *discrete* grunt consisted of a succession of short but distinct sounds each lasting between 0.5 and 1 sec. On average 6.02 grunts per grunting session (± 3.9 SD, n = 98) were emitted. On average O recorded 1.6 grunting sessions per vocal bout (± 1.2 SD, range 1 - 7, n = 53).

In *continuous* grunts, the succession of short distinct sounds were emitted much more rapidly (<0.5 secs) than in the *discrete* grunt. In addition the number of sounds emitted in one grunting session was higher, average 8.1 (± 3.6 SD, n = 263), as was the number of grunting sessions per vocal bout, average 3.4 (± 5.5 SD, range 1-35, n = 81). A grunting bout could last up to 10 mins. The contexts and functions of the *discrete* and *continuous* grunt were similar and a bird would often switch from one to the other in the same vocal bout. The grunt was the most common vocalisation heard when males, particularly with chicks, encountered other conspecifics, other animals and sometimes myself. It was clearly communicating anxiety and distress about the intrusion and notifying the intruder of aggressive intent. This intent was often carried through to action with the male charging at or chasing the intruder, in particular, subadults but also other males, other animals such as feral pigs and monitor lizards and even myself. Both sexes and all age classes except chicks used the grunt vocalisation.

Rumble The *rumble* was another low-pitched vocalisation that was produced by vibrating the throat. It was a continuous sound that was not as deep and intense as the *rumble* boom as it did not use the considerable volume of air required to produce the rumble boom. Therefore, it was a vocalisation that could be produced by subadults as well as adults. The *rumble* was rarely heard (n = 14), and since it was most often directed at me, particularly during the early stages of habituation, it may have been signifying apprehension, threatening lightly, yet conveying a lack of aggressive intent.

Wheeze / Moan The *wheeze/moan* was a vocalisation that was emitted by a male when he was accompanied by chicks. It was normally a fairly soft, medium- to low-pitched sound that the male would use frequently while foraging. This call, together with the sound of a clicking beak, would attract the chicks to a food item the male had either prepared for them or identified its location[3] . Since it was a vocalisation that was only ever heard in this context it was obviously a specific male-chick communication signal that

[3] Details of this foraging interaction between male and chicks are presented in Chapter 8.

Appendix A.2.3 (Cont.....)

appeared to not only function as an expression of an internal state but also to signal feeding.

Whistle Chicks vocalised by producing a whistle-like call which varied from being either short- or long-drawn, low- or high-pitched. This has enabled the whistle to be categorised as either a normal or distress call. The chick emitted a *normal whistle* intermittently throughout the day which may have functioned as a security check and/or foraging call between chick and parent. Often the male would respond to this whistle with a wheeze. However, when apparently distressed in some way chicks would emit a long and high-pitched whistle - the greater the distress, the louder and higher the pitch. This *distress* whistle was associated with four situations. Firstly, in the first few days after hatching this *distress* whistle increased in intensity until the male left the nest. In this context it may have been communicating hunger. Secondly, whenever the chicks lost sight of the male they would also vocalise in this way. The male would respond immediately by running toward the call. Thirdly, one of Dillenia's chicks, Boronia, used this call frequently during the last month of its life even though it was constantly at Dillenia's side. In this context the call may have been conveying ill health. And fourthly, the chick Alata used this *distress* whistle when, on reaching independence age it was abandoned by the male. This was the time of loudest and highest pitched distress whistle. Obviously the chick was desperately trying to attract the attention of the male.

Appendix A.3.1: Notes on the Development of Foraging Behaviour in Cassowary Chicks.

Foraging strategies utilised by chicks varied considerable in the early stages of their life. A summary description based on intensive observations made from the time of hatching of the chicks, Alata and Boronia, to the time Alata was abandoned (having reached the age of independence) by Dillenia, is presented.

At the nest site The first pecking action of the newly hatched chicks occurred approximately three hours after hatching. This action was an attempt to pick up leaves and twigs which was an imitation of the male's pecking behaviour at the time. The second pecking behaviour was aimed at the leg of Boronia, the second hatched chick[4]. According to Ficken (1977) pecking responses which are directed toward small inedible objects in the environment is not uncommon in young birds. Twenty hours after hatching Alata was pecking at and occasionally swallowing small soil clumps. Alata also continued to pick up and drop small twigs and leaves, a pecking response that was now also adopted by Boronia. However, this second hatched chick did not appear as active in this behaviour as the first. Forty-eight hours after hatching and still at the nest site, both chicks continued to peck at leaves and twigs and consume clumps of soil. In addition, they consumed the occasional dead marsh fly. At three days old and still at the nest site, Alata was observed pecking at Dillenia's red wattles. Up until this time I had not observed Dillenia directly encouraging, teaching or providing any food for the chicks, nor did I see him feeding. However, on this third day, Dillenia began foraging within the immediate vicinity of the nest site (radius = 3m) on Solitaire Palm, *Ptychosperma elegans,* a small red fruit (diameter = 15 - 20mm; Cooper & Cooper, 1994). Furthermore, I now observed the first sign of active parental involvement in providing food for the chicks. This involved dislodging the fruit flesh from the seed by a continuous chomping or masticating action with the fruit between the beak. The chicks, which remained very close to the male at all times, occasionally picked up the dislodged pieces of fruit. They also occasionally picked up a whole fruit but did not attempt to swallow it nor the bare seeds. During this time I also observed the chicks pecking at Dillenia's red wattles much more frequently (five times in a four hour period) which suggests that the connection between the colour red and food was providing a strong visual cue for these chicks (Pratt, 1981). This foraging strategy continued for the first four hours after the family left the nest.

Away from nest site At ten days old, the chicks appeared to have made the connection between the sound of the male chomping the fruit between its beak and the availability of food. When this sound occurred both chicks ran toward the male to collect the pieces of fruit which had become dislodged from the seed. Their apparent reliance on the male for identification and provision of food continued until they were at least 21 days old. During these first 21 days there was a gradual shift from total reliance on food being provided by the male to an increased reliance on their own consumption of food items that were at least of a size that they could swallow. The major role of the male parent appeared to now shift from being sole provider of food fragments to food identifier. Rather than break off the flesh from fruits the male would now use the same chomping sound to identify food items for the chicks. When providing the chicks with fungi or some other food item they could not reach, the male would dislodge the item from

[4] Interestingly this same behaviour was observed 10 months later when Alata was beside the body of Boronia. Alata was continuously pecking at the legs of the dead chick as if trying to stimulate it into rising.

Appendix A.3.1 (Cont.....)

its source and drop it in front of the chicks. Any item that was still too large for the chicks to swallow the male would break it up for them.

At four months the chicks were foraging almost entirely on their own, often running ahead of Dillenia to a food or water source, suggesting their increased familiarity with the area and the locations of these critical sources. It now was only with very large fruits such as *Faradaya splendida* (90 x 60 mm; Cooper & Cooper, 1994), that Dillenia continued to break off the fruit from the seed so that the chicks could eat it. With fruits which were too high for the chicks to reach such as figs, *Ficus* spp., Dillenia would jump up and dislodge them from the branches and then drop them in front of the chicks.

Appendix A.4.1: Percent Composition of Food Items in the Cassowary Diet In 1990.

(* = no data available; P = present but < 0.1%)

	1990											
FAMILY/SPECIES	J *	F *	M *	A	M	J	J	A	S	O	N	D
AGAVACAE												
Cordyline terminalis				0.6								0.5
ANACARDIACEAE												
Mangifera indica												0.3
Pleiogynium timorense						P			P			
Semicarpus australiensis												0.7
ANNONACEAE												
Annona glabra												
Polyalthia spp												0.2
APOCYNACEAE												
Alxyia spicata								3.8	14.3	0.4	16.7	3.4
ARALIACEAE												
Polyscias spp.								5.6				
ARECACEAE												
Archontophoenix alexandrae				4.5	8.2	1.7	0.9					
Calamus australis					P	P	P					
Hydriastele wendlandiana												
Linospadix minor				0.4								
Ptychosperma elegans					0.9	1.6	0.3	66.9	30.5	7.1	0.8	
BURSERACEAE												
Canarium vitiense												P
CLUSIACEAE												
Calophyllum sil											0.3	
COMBRETACEAE												
Terminalia arenicola								P	P			
Terminalia catappa												
Terminalia muelleri												
Terminalia sericocarpa												
CUCURBITACEAE												
Diplocyclos palmatus											P	P
DAVISONIACEAE												
Davidsonia prunis											0.5	
EBENACEAE												
Diospyros hebecarpa											P	
ELAEOCARPACEAE												
Elaeocarpus angustifolius					0.1	1.1	2.1	0.9		P	P	
Elaeocarpus culminicola											0.8	
Elaeocarpus eumundi				22.4	7.8	1.8	0.4	0.3	P			
ERYTHROXYLACEAE												
Erythroxylum ecarinatum												
EUPHORBIACEAE												
Antidesma erostre												
Mallotus mollissimus					P							
GOODENIACEAE												
Scaevola sericea												
ICACINACEAE												
Gomphardra australiana											0.3	P
LAURACEAE												
Beilschmiedia collina											15.2	0.3
Cryptocarya hypospodia								0.6	27.6	39.3	0.8	7.2
Cryptocarya lividula												
Cryptocarya oblata						P	0.8	0.4	P		0.4	0.8
Endiandra cowleyana									P	3.3	3.8	1.0
Endiandra hypotephra					0.3	0.6	P	0.8	P			

Appendix A.4.1 (Cont.....)

	1990											
FAMILY/SPECIES	**J** *	**F** *	**M** *	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**
Endiandra leptodendron											0.2	P
Endiandra montana				69.9	10.9	3.2	0.2					
Endiandra spp.						P			P		0.2	
Litsea leefana												
Neolitsea delbata					P	0.2	0.2					
LORANTHACEAE												
Amylotheca dictyophleba												
MENISPERMACEAE												
Hysperpa laurina												
Pachygone longifolia												
MORACEAE												
Ficus hispida				0.1	P	P	P					0.2
Ficus drupacea												
Ficus spp.												
MYRISTICACEAE												
Myristica insipida									P	0.1	0.1	P
MYRTICEAE												
Acema graveolens												
Acmena hemilampra				2.0	67.2	72.4	84.1	8.0				
Acmenasperma claviflorium												46.5
Eugenia reinwardtiana												
Psidium spp.					P	0.5						
Rhodamnia sessiflora												
Rhodomyrtus spp.												
Syzygium angophoroides									0.7		34.7	5.7
Syzygium alliiligneum					4.0	16.9	10.7	1.3	P			
Syzygium cormiflorum												7.0
Syzygium forte											16.2	7.4
Syzygium kuranda												
Fenzlia spp									5.0	0.3		
OLACACEAE												
Ximenia americana												
OLEACEAE												
Chionanthus ramiflorus												
PANDANACEAE												
Pandus conicus						P		0.1	P	1.1	1.2	1.6
PASSIFLORACEAE												
Passiflora spp.												
ROSACEAE												
Prunus turnerana											P	P
RUBIACEAE												
Canthium coprosmoides												
Guettardella tenuiflora										P	P	
Morinda citrofolia												
Nauclea orientalis												
Randia fitzalanii												
RUTACEAE												
Acronychia acronychoides									1.0	1.3		
Acronychia vestita								1.0	1.0	P	P	
Halfordia scleroxylia											P	P
SMILACEAE												
Smilax australis									0.1			
SAPINDACEAE												
Diploglottis diphyllostegia										P	0.3	
Ganophyllum falcatum												
Mischocarpus pyriformis												
Sarcotoechia protracta												
SAPOTACEAE												

Appendix A.4.1 (Cont.....)

	1990											
FAMILY/SPECIES	**J** *	**F** *	**M** *	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**
Palaquium galactoxylum										25.5	0.7	1.2
Planchonella chartacea												
Planchonella obovoidea								9.6	18.7	20.5	3.2	13.8
Pouteria spp. 1.												
Pouteria spp. 2.												
SOLANACEAE												
Physalis minma												
Solanum spp												
VERBENACEAE												
Gmelina dalrympleana												0.4
Gmelina fasculiflora								0.1			2.7	1.0
Faradaya splendida											0.7	0.4
Lantana camara												
VITACEAE												
Cissus penninervus												P
XANTHOPHYLLACEAE												
Xanthophyllum octandrum												0.3
UNIDENTIFIED PLANT SPECIES (n = 16)					0.5 (1)	P (1)	0.3 (1)	0.4 (4)	P (2)	P (1)		
No. of Species	*	*	*	**7**	**14**	**18**	**13**	**17**	**20**	**15**	**27**	**27**
OTHER ITEMS												
Fungi					P	P	P	P	P	P		
Vertebrates												
Toads (Bufonidae)												
Birds												
Invertebrates												
Earth worms (Lumbricus)												
Snails (Mesogastropoda)												
Beetles (Coleoptera)												
Cicadas (Homoptera)												
Inorganic												
Soil												
Rocks												
Sea shells												
No. of Other Items	*	*	*	0	1	1	1	1	1	1	0	0

Appendix A.4.2: Percent Composition of Food Items in the Cassowary Diet in 1991.

(* = no data available; P = present but < 0.1%)

	1991											
FAMILY/SPECIES	J	F	M	A	M	J	J	A	S	O *	N	D
AGAVACAE												
Cordyline terminalis	1.0											2.6
ANACARDIACEAE												
Mangifera indica												
Pleiogynium timorense						P						
Semicarpus australiensis	5.3										3.6	7.2
ANNONACEAE												
Annona glabra												P
Polyalthia spp												4.3
APOCYNACEAE												
Alxyia spicata	3.6				5.0	P	0.2		19.6		31.2	0.4
ARALIACEAE												
Polyscias spp.			83.1	20.7								
ARECACEAE												
Archontophoenix alexandrae				53.0	4.6		2.6	2.9	0.3			
Calamus australis	11.4	0.7	0.6		0.3						2.7	3.6
Hydriastele wendlandiana												P
Linospadix minor				0.4								
Ptychosperma elegans					0.5		9.4	37.4	18.6		P	P
BURSERACEAE												
Canarium vitiense	P										P	
CLUSIACEAE												
Calophyllum sil											P	
COMBRETACEAE												
Terminalia arenicola				0.2								
Terminalia catappa									P			
Terminalia muelleri				0.3	1.2							
Terminalia sericocarpa	5.5		1.0									
CUCURBITACEAE												
Diplocyclos palmatus												P
DAVISONIACEAE												
Davidsonia prunis	P					P	P	P	0.3		P	
EBENACEAE												
Diospyros hebecarpa	0.1	P									P	1.9
ELAEOCARPACEAE												
Elaeocarpus angustifolius				0.3	0.6		1.5	7.4	0.3			
Elaeocarpus culminicola												
Elaeocarpus eumundi												
ERYTHROXYLACEAE												
Erythroxylum ecarinatum					P							
EUPHORBIACEAE												
Antidesma erostre					38.6	0.5	7.8	13.7	3.3			
Mallotus mollissimus												P
GOODENIACEAE												
Scaevola sericea	1.7		1.5									
ICACINACEAE												
Gomphardra australiana	3.3										2.2	
LAURACEAE												
Beilschmiedia collina												
Cryptocarya hypospodia	1.8								0.7		1.5	
Cryptocarya lividula		P										
Cryptocarya oblata	1.1					0.3	0.2	0.7	P			
Endiandra cowleyana												
Endiandra hypotephra								3.8	18.9			

Appendix A.4.2 (Cont.....)

	1991											
FAMILY/SPECIES	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O***	**N**	**D**
Endiandra leptodendron											0.5	
Endiandra montana				1.1	0.4			P	P			
Endiandra spp.					P	1.7	9.8	0.3				
Litsea leefana					1.0		4.3	11.9	1.8			
Neolitsea delbata			1.1	0.4								
LORANTHACEAE												
Amylotheca dictyophleba				1.8	8.7		8.2	17.0	0.2			
MENISPERMACEAE												
Hysperpa laurina	P											
Pachygone longifolia	P											
MORACEAE												
Ficus hispida	2.4	0.2		5.7	6.3	P		0.3				
Ficus drupacea						0.2	12.3					
Ficus spp.												
MYRISTICACEAE												
Myristica insipida	1.1							P			0.9	
MYRTICEAE												
Acema graveolens												
Acmena hemilampra					7.3	0.4						
Acmenasperma claviflorium	7.9										5.7	11.7
Eugenia reinwardtiana											1.0	2.2
Psidium spp.							P					
Rhodamnia sessiflora			7.7		2.6	78.0	2.1					
Rhodomyrtus spp.							1.9	3.4	0.8			
Syzygium angophoroides												61.2
Syzygium alliiligneum					3.0	P	3.7	0.4				
Syzygium cormiflorum						0.3	2.9	0.5	0.7		1.1	1.3
Syzygium forte	28.4	97.8										
Syzygium kuranda					0.6							
Fenzlia spp									5.3			
OLACACEAE												
Ximenia americana	0.4											
OLEACEAE												
Chionanthus ramiflorus									2.4		0.5	
PANDANACEAE												
Pandus conicus									0.2		0.7	1.3
PASSIFLORACEAE												
Passiflora spp.	0.1					0.2		0.2				
ROSACEAE												
Prunus turnerana	P						P		0.4			
RUBIACEAE												
Canthium coprosmoides			0.7	1.4								
Guettardella tenuiflora	P											
Morinda citrofolia		P	0.2	2.0								
Nauclea orientalis												
Randia fitzalanii												
RUTACEAE												
Acronychia acronychoides									10.8			
Acronychia vestita									0.1		0.6	
Halfordia scleroxylia												
SMILACEAE												
Smilax australis												
SAPINDACEAE												
Diploglottis diphyllostegia									10.1			
Ganophyllum falcatum			0.3									
Mischocarpus pyriformis												
Sarcotoechia protracta			0.2			0.1	P					
SAPOTACEAE												

Appendix A.4.2 (Cont.....)

	1991											
FAMILY/SPECIES	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O** *	**N**	**D**
Palaquium galactoxylum											6.5	1.2
Planchonella chartacea	P	P				1.1		0.4	3.8		41.2	0.2
Planchonella obovoidea	0.9								0.7			
Pouteria spp. 1.				0.4								
Pouteria spp. 2.							0.6					
SOLANACEAE												
Physalis minma				7.8								
Solanum spp												
VERBENACEAE												
Gmelina dalrympleana	0.3	P		4.3								
Gmelina fasculiflora	4.5											
Faradaya splendida	P										P	
Lantana camara			P	P	14.3	14.0	17.6					
VITACEAE												
Cissus penninervus		P	3.0									
XANTHOPHYLLACEAE											P	
Xanthophyllum octandrum	P											P
	P											
UNIDENTIFIED PLANT SPECIES (n = 15)	1.2 (4)		0.2 (1)		1.2 (2)	2.3 (1)	14.4 (1)				P (4)	
No. of Species	**33**	**9**	**13**	**16**	**20**	**17**	**21**	**18**	**24**	*	**27**	**17**
OTHER ITEMS												
Fungi	0.5	0.6		P	2.1	0.5	P	P			P	P
Vertebrates												
Toads (Bufonidae)							P					
Birds		P							P			
Invertebrates												
Earth worms (Lumbricus)	P											
Snails (Mesogastropoda)	P	P					P	P	P		P	
Beetles (Coleoptera)		P										
Cicadas (Homoptera)	0.4	P										
Inorganic												
Soil		P		P	1.5		0.1					
Rocks				P					P			
Sea shells						P						
No. of Other Items	4	6	0	3	2	2	4	2	3	*	2	1

Appendix A.4.3: Percent Composition of Food Items in the Cassowary Diet in 1992.

(* = no data available; P = present but < 0.1%)

	1992											
FAMILY/SPECIES	J *	F	M	A *	M *	J	J	A *	S	O	N	D *
AGAVACEAE												
Cordyline terminalis												
ANACARDIACEAE												
Mangifera indica										P		
Pleiogynium timorense						P				P		
Semicarpus australiensis		P				P						
ANNONACEAE												
Annona glabra												
Polyalthia spp		1.7										
APOCYNACEAE												
Alxyia spicata		12.3	1.8			0.7	15.9		19.2	22.4	20.1	
ARALIACEAE												
Polyscias spp.		4.7										
ARECACEAE												
Archontophoenix alexandrae						8.0	0.1					
Calamus australis		18.6	28.0			P	0.2					
Hydriastele wendlandiana												
Linospadix minor			P									
Ptychosperma elegans						0.7	4.9		10.8	14.2	0.6	
BURSERACEAE												
Canarium vitiense						0.2	0.4					
CLUSIACEAE												
Calophyllum sil												
COMBRETACEAE												
Terminalia arenicola			0.9			P	1.9					
Terminalia catappa							P					
Terminalia muelleri						P	0.2					
Terminalia sericocarpa		1.2										
DAVISONIACEAE												
Davidsonia prunis			P									
EBENACEAE												
Diospyros hebecarpa		P										
ELAEOCARPACEAE												
Elaeocarpus angustifolius						1.7	15.5		0.3	P		
Elaeocarpus culminicola												
Elaeocarpus eumundi		P	P			0.3						
ERYTHROXYLACEAE												
Erythroxylum ecarinatum												
EUPHORBIACEAE												
Antidesma erostre						P			0.7			
Mallotus mollissimus												
GOODENIACEAE												
Scaevola sericea		0.6	10.1			0.2	0.1					
ICACINACEAE												
Gomphardra australiana		1.9										
LAURACEAE												
Beilschmiedia collina												
Cryptocarya hypospodia						P	9.1		P			
Cryptocarya lividula												
Cryptocarya oblata						1.0	10.1	0	0.6			
Endiandra cowleyana												
Endiandra hypotephra						P	2.1		4.9	1.4	1.4	
Endiandra leptodendron		0.5										
Endiandra montana						0.7	0.4					

Appendix A.4.3 (Cont.....)

FAMILY/SPECIES	1992											
	J*	F	M	A*	M*	J	J	A*	S	O	N	D*
Endiandra spp.						P			P			
Litsea leefana									38.5	9.6	0.4	
Neolitsea delbata		1.5										
LORANTHACEAE												
Amylotheca dictyophleba												
MENISPERMACEAE												
Hysperpa laurina		0.2	P									
Pachygone longifolia												
MORACEAE												
Ficus hispida												
Ficus drupacea		P								1.8		
Ficus spp.		P										
MYRISTICACEAE												
Myristica insipida		P										
MYRTICEAE												
Acema graveolens						P	P					
Acmena hemilampra						82.4	30.3					
Acmenasperma claviflorium												
Eugenia reinwardtiana		32.4	5.1									
Psidium spp.												
Rhodamnia sessiflora			42.8									
Rhodomyrtus spp.							3.4					
Syzygium angophoroides												
Syzygium alliiligneum						0.6	1.1		0.6	0.5		
Syzygium cormiflorum		0.2										
Syzygium forte		0.3										
Syzygium kuranda						P				P		
Fenzlia spp							0.2		0.6			
OLACACEAE												
Ximenia americana												
OLEACEAE												
Chionanthus ramiflorus									5.1	1.4	1.4	
PANDANACEAE												
Pandus conicus			4.4			0.2			0.3	1.0	4.8	
PASSIFLORACEAE												
Passiflora spp.												
ROSACEAE												
Prunus turnerana									P		0.1	
RUBIACEAE												
Canthium coprosmoides		0.3	0.5									
Guettardella tenuiflora												
Morinda citrofolia		P	0.1									
Nauclea orientalis			0.5									
Randia fitzalanii						P	P		P			
RUTACEAE												
Acronychia acronychoides									12.9	7.1	4.0	
Acronychia vestita										P	P	
Halfordia scleroxylia												
SMILACEAE												
Smilax australis		P	P							P		
SAPINDACEAE												
Diploglottis diphyllostegia										21.8		
Ganophyllum falcatum		8.5										
Mischocarpus pyriformis		P	P									
Sarcotoechia protracta												
SAPOTACEAE												
Palaquium galactoxylum		0.2										

Appendix A.4.3 (Cont.....)

FAMILY/SPECIES	1992 J*	F	M	A*	M*	J	J	A*	S	O	N	D*
Planchonella chartacea		4.7							4.6	4.5	66.1	
Planchonella obovoidea												
Pouteria spp. 1.			P									
Pouteria spp. 2.												
SOLANACEAE												
Physalis minma												
Solanum spp						2.3						
VERBENACEAE												
Gmelina dalrympleana		1.3	0.3									
Gmelina fasculiflora											0.3	
Faradaya splendida										0.1	0.6	
Lantana camara			P							13.7		
VITACEAE												
Cissus penninervus		8.3	1.5									
XANTHOPHYLLACEAE												
Xanthophyllum octandrum												
										P		
UNIDENTIFIED PLANT SPECIES (n = 15)		0.3 (1)	2.2 (3)			0.6 (3)	3.6 (1)		P (1)			
No. of Species	*	**29**	**23**	*	*	**28**	**21**	*	**18**	**19**	**12**	*
OTHER ITEMS												
Fungi		P				P						
Vertebrates												
Toads (Bufonidae)												
Birds							P					
Invertebrates												
Earth worms (Lumbricus)		P										
Snails (Mesogastropoda)		P				P						
Beetles (Coleoptera)												
Cicadas (Homoptera)												
Inorganic												
Soil		P										
Rocks		P										
Sea shells												
No. of Other Items	*	5	0	*	*	2	1	*	0	0	0	*

APPENDIX B: STUDY 2

APPENDIX B. 1

Respondent Details and Research Design

Appendix B.1.1 : Demographic Details

Demographics	Rural	Semiurban	Urban	Total
Age[1]	n=35	n=140	n = 142	**n = 317**
Age Range	17-75	16-78	15-82	**15 - 82**
Mean (± SD)	45.46 (±14.82)	46.37 (±16.00)	36.21 (±14.56)	**41.72 (±15.87)**
10-year Cohorts: (%)				
15 - 24	5.7%	9.3%	26.2%	**16.4%**
25 - 34	20.0%	19.3%	23.9%	**21.5%**
35 - 44	28.6%	19.3%	21.1%	**21.1%**
45 - 54	14.3%	21.4%	21.1%	**20.5%**
55 - 64	17.1%	12.1%	2.8%	**8.5%**
> 65	14.3%	18.6%	4.9%	**12.0%**
Gender	n = 35	n = 143	n = 142	**n = 320**
Female	45.7%	42.0%	45.0%	**43.7%**
Male	54.3%	58.0%	55.0%	**56.3%**
Education[2]	n = 35	n = 141	n = 142	**n = 318**
Primary Level	17.1%	10.6%	4.9%	**8.8%**
Secondary Level	57.2%	47.5%	29.6%	**40.6%**
TAFE/College Level	14.3%	22.7%	17.6%	**19.5%**
University Level	11.4%	19.2%	47.9%	**31.1%**
Income[3]	n = 32	n = 128	n = 132	**n = 292**
< $10 000	15.6%	19.5%	12.1%	**15.8%**
$10 000 - $19 999	18.8%	19.5%	3.8%	**12.3%**
$20 000 - $29 999	31.2%	22.7%	24.2%	**24.3%**
$30 000 - $39 999	6.2%	17.2%	20.5%	**17.5%**
$40 000 - $49 999	3.2%	10.9%	13.6%	**11.3%**
> $50 000	25.0%	10.2%	25.8%	**18.8%**
Length of Residency[4]	n =35	n = 141	n = 140	**n = 316**
≤ 10 years	42.9%	64.5%	78.6%	**66.5%**
> 10 years	57.1%	35.5%	21.4%	**33.5%**

Note: (1) Urban residents younger than semiurban and rural residents (p = 0.0001)
(2) Urban residents more educated than semiurban and rural residents (p = 0.0001)
(3) Urban residents have higher family income than semiurban residents (p = 0.0004)
(4) Length of residency longer for rural residents than for semiurban and urban residents (p =0.0004)

Appendix B.1.2: Pilot Survey Of Granadilla Residents

This survey is a pilot study of the rural community, Granadilla. The information required has been divided into four sections, Resident Information, Property Information, Cassowary Information and Feral Animal Information. In addition, at the completion of this survey, permission is sought from the property owners for this researcher to have access to their property for the purpose of a cassowary field survey.

Name of Interviewer and Field Researcher	:	Joan Bentrupperbäumer
Date	:	.....
Permission to access property	:	**Granted ..... Not Granted .....**

SECTION 1 : Resident Information

Details of Property Residents

1. Name : .....
2. Home Address : .....
3. Occupation : .....
4. Age : .....(years).
5. Gender : .....Male .....Female
6. Family Details : .....
   .....
7. Time on Property : .....(months) or .....(years)

Appendix B.1.2 (Cont.....)

SECTION 2 : Property Information

Details of Property

1 Location description : Section.....
.....

2. Agricultural activity : .....
.....

3. Total Area (approx) : .....ha

4. Area per activity : a) agriculture .....ha
(approx) b) house + orchard.....ha
c) fallow land .....ha
d) natural forest .....ha
e) regrowth .....ha

5. Activity History : .....
.....
.....

Map: Property Location - Granadilla Valley

Appendix B.1.2 (Cont.....)

Landscape Description

6. Topography : .....
.....
.....
.....

7. Vegetation Types : .....
.....
.....
.....

8. Water Course : .....
.....
.....
.....

Additional Information

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.....
..

Appendix B.1.2 (Cont.....)

SECTION 3: Cassowary Information

A. Cassowary Occurrence.

1. Have you ever seen a cassowary in the wild? **Yes** **No**

2. Do you think there are many cassowaries about? **Yes** **No** **Don't Know**

3. Here on your property have you seen any? **Yes** **No**

4. How many different cassowaries have you seen here in 1992? .....

5. What were they?
   a) adults alone .....
   b) adults with chicks .....
   c) chicks .....
   d) subadults .....

6. How could you tell that they were different birds? .....
   .....
   .....

7. Do you see them often? **Yes** **No**

8. How many do you estimate to be here now? .....

9. Before 1992, how many cassowaries did you see here ? .....

10. What were they?
    a) adults alone .....
    b) adults with chicks .....
    c) chicks .....
    d) subadults .....

11. Do you think there were more living here prior to 1992? **Yes** **No** **Don't Know**

12. Do you think there are many cassowaries living here now in the Granadilla Valley? **Yes** **No** **Don't Know**

13. In the past 5 years how many have you seen?
    a) adults alone .....
    b) adults with chicks .....
    c) chicks .....
    d) subadults .....

14. Are you seeing fewer cassowaries now in this valley? **Yes** **No**

Appendix B.1.2 (Cont.....)

B. Cassowary Movements

15. Where in the valley other than here on your property have you seen cassowaries?

.....

.....

.....

.....

16. What were they doing?

.....

.....

.....

.....

17. Do you think they move around a lot? **Yes** **No** **Don't Know**

C. Availability of Food and Water

18. Do cassowaries come and eat your fruit crops? **Yes** **No**

19. What fruit do they eat? .....

.....

.....

20. Do they destroy the crop? **Yes** **No**

21. Does it worry you that they take this fruit? **Yes** **No**

22. Do you feed the cassowaries now? **Yes** **No**

23. What do you feed them? .....

.....

.....

24. Have you fed them in the past? **Yes** **No**

25. What made you stop feeding them?.....

.....

Appendix B.1.2 (Cont.....)

26. Do you think there is plenty of food for them here in your forest? **Yes No Don't Know**

27. Is there natural water available here on your property? **Yes No**

28. Is it available during the dry season? **Yes No**

29. What is the nearest water source to you here?.....
.....

D. Human-Cassowary Interactions

30. Do you mind cassowaries being here on your property? **Yes No**

31. Do you think cassowaries are dangerous? **Yes No**
Comments. .....

32. Have you ever had any trouble with cassowaries? **Yes No**

33. Have you been subjected to aggressive encounters? **Yes No**

34. Have you actually been attacked? **Yes No**

35. Describe what happened. .....
.....
.....

36. Are you afraid of cassowaries? **Yes No**

37. Do you consider them to be a pest, a nuisance in any way? **Yes No**

38. Do you think they are valuable in any way? **Yes No Don't know**

39. In what way are they valuable? .....

Appendix B.1.2 (Cont.....)

E. Perception of cassowary conservation status and threats.

40. Do you think the survival of the cassowary is threatened? **Yes** **No** **Don't know**

41. Do you think cassowaries are in danger of becoming extinct in the foreseeable future? **Yes** **No** **Don't know**

42. What do you think threatens the survival of the cassowary? .....
.....
.....

SECTION 4 : Feral Animal Information.

1. **Dogs**

a) Number .....
b) Breed .....
c) Behaviour .....
.....
.....
.....
.....
d) Attacks on Cassowaries .....
.....
.....
.....
.....
.....
e) Any additional comments. .....
.....
.....
.....
.....

2. **Pigs**

a) Have you seen pigs here in the past? **Yes** **No**
b) Do you see them here now? **Yes** **No**
c) How often? .....
d) How many? .....

Appendix B.1.2 (Cont.....)

e) Do they cause damage to you property? **Yes** **No**

f) Do you do anything to control them? **Yes** **No**

g) What do you do?.....

.....

.....

.....

.....

.....

.....

h) Any additional comments?.....

.....

.....

.....

.....

.....

.....

.....

.....

APPENDIX B.1.3: Survey Instrument

JAMES COOK UNIVERSITY OF NORTH QUEENSLAND

POSTAL ADDRESS:
James Cook University
TOWNSVILLE Q 4811
AUSTRALIA

TELEPHONE:
(077) 81 4111

FACSIMILE:
(077) 79 6371

DEPARTMENT OF PSYCHOLOGY AND SOCIOLOGY
Facsimile: (077) 79 5435

Notes about the Survey

This survey in which you are being asked to participate is one of a number of studies conducted at the James Cook University which are exploring people's responses to the North Australian natural environment.

Your participation involves answering a number of questions in the context of a short interview. The results of the survey will help us to better understand the relationship between people and the natural environment.

Your specific involvement in this survey is very important to us as you are one of a relatively small number of households in the larger Mission Beach area which has been statistically selected for this research. We therefore would be very grateful if you could spare some time to answer the questions in this survey. The interview should take about 45 minutes to complete. The interviewers are all undergraduate and postgraduate psychology students in the School of Behavioural Sciences at James Cook University.

You can be assured that your answers will be kept anonymous and strictly confidential. No individuals or households will be identified with these responses and the information will only be used for comparisons amongst groups of people.

Name of Interviewer :_____

Time of Interview : Start_____ Finish_____ Total_____

Date : _____/_____/_____

Location : **(Please tick One)**

a) Urban _____

b) Semi-urban _____

c) Rural _____

2

SECTION 1a

We would first like to get your opinion on a range of important *social, political and economic issues* facing Australia today. Please indicate on a scale from 1 to 5 the extent to which you disagree or agree with each of the following statements.

Strongly Disagree 1	Moderately Disagree 2	Neither/ Nor 3	Moderately Agreee 4	Strongly Agree 5

	(Please circle ONE number only)	Disagree 1	2	3	4	Agree 5
1	Regulation of business by Government usually does more harm than good.	1	2	3	4	5
2	There should be more Government regulation of business.	1	2	3	4	5
3	Government regulation and planning always leads to bureaucracy, ineffifiency, and stagnation.	1	2	3	4	5
4	The Federal Government has too much power over citizens and Local Government.	1	2	3	4	5
5	Government planning inevitably results in the loss of essential liberties and freedoms.	1	2	3	4	5
6	The Federal Government should not interfere with the free enterprise system.	1	2	3	4	5
7	Just because something is run by the Government it doesn't mean it will be inefficient and wasteful.	1	2	3	4	5
8	The profits of big business and industry should be controlled by Government.	1	2	3	4	5
9	We should know if something new will work before taking a chance on it.	1	2	3	4	5
10	If you start trying to change things very much you usually make them worse.	1	2	3	4	5
11	It is better to stick with what we have than try new things we don't really know about.	1	2	3	4	5
12	Among the fundamental rights in this country is the use of one's property without outside interference.	1	2	3	4	5
13	Property owners have an inherent right to use their land as they see fit.	1	2	3	4	5

3

	(Please circle ONE number only)	Disagree 1	2	3	4	Agree 5
14	Government restrictions on the use of private property are necessary in order to insure that the land will not be permanently harmed.	1	2	3	4	5
15	Property owners have the right to abuse their land even if it becomes unfit for use by future generations.	1	2	3	4	5
16	Most problems can be solved by applying more and better technology.	1	2	3	4	5
17	Scientists can solve any problem we might face if they are given enough time and money.	1	2	3	4	5
18	We cannot keep counting on science and technology to solve human's problems.	1	2	3	4	5
19	Through science and technology we can continue to raise our standard of living.	1	2	3	4	5
20	It is often good to restrict the rights of individuals for the good of society.	1	2	3	4	5
21	In order to solve some of our society's problems it will be necessary to place restrictions on individual's behaviour.	1	2	3	4	5
22	Economic growth improves the quality of life of all citizens in Australia.	1	2	3	4	5
23	The positive benefits of economic growth far outweigh any negative consequences.	1	2	3	4	5
24	Australians would be better off if the nation's economic growth slowed right down.	1	2	3	4	5
25	There is too much concern with restricting growth and not enough with encouraging it.	1	2	3	4	5
26	Australians are going to have to drastically reduce their level of consumption over the next few years.	1	2	3	4	5
27	Australians are going to have to learn to do without many of the things they have taken for granted in the past.	1	2	3	4	5
28	The standard of living for the average Australian will continue to improve for the forseeable future.	1	2	3	4	5
29	Australians can expect that their quality of life will be better in the future.	1	2	3	4	5

4

SECTION 1b

We would also like to get your opinion on a range of *environmental issues.* For each of the following statements please indicate on a scale from 1 to 5 the extent to which you disagree or agree.

Strongly Disagree 1	Moderately Disagree 2	Neither/ Nor 3	Moderately Agree 4	Strongly Agree 5

		Disagree				Agree
	(Please circle ONE number only)	**1**	**2**	**3**	**4**	**5**
1	We are approaching the limit of the number of people the earth can support.	1	2	3	4	5
2	The balance of nature is very delicate and easily upset.	1	2	3	4	5
3	Humans have a right to modify the natural environment to suit their needs.	1	2	3	4	5
4	Humans were created to rule over the rest of nature.	1	2	3	4	5
5	When humans interfere with the rest of nature it often produces disasterous consequences.	1	2	3	4	5
6	Plants and animals exist primarily to be used by humans.	1	2	3	4	5
7	To maintain a healthy economy we will have to develop a "steady state" economy where industrial growth is controlled.	1	2	3	4	5
8	Humans must live in harmony with nature in order to survive.	1	2	3	4	5
9	The earth is like a space ship with only limited room and resources.	1	2	3	4	5
10	Humans need not adapt to the natural environment because they can remake it to suit their needs.	1	2	3	4	5
11	There are limits to growth beyond which our industralised society cannot expand.	1	2	3	4	5
12	Humans are severely abusing the environment.	1	2	3	4	5
13	Protecting the environment will threaten jobs for people like me.	1	2	3	4	5

5

	(Please circle ONE number only)	Disagree 1	2	3	4	Agree 5
14	Laws to protect the environment limit my choices and personal freedom.	1	2	3	4	5
15	A clean environment provides me with better opportunities for recreation.	1	2	3	4	5
16	We don't need to worry much about the environment because future generations will be better able to deal with these problems than we are.	1	2	3	4	5
17	The effects of pollution on public health are worse than we realise.	1	2	3	4	5
18	Pollution generated here harms people all over the earth.	1	2	3	4	5
19	Claims that current levels of pollution are changing the earth's climate are exaggerated.	1	2	3	4	5
20	Over the next several decades, thousands of species will become extinct.	1	2	3	4	5

Thank you for you co-operation so far.
Your responses to these questions are very important to us.
Please continue to pay close attention to the instructions at the beginning of each question.

6

SECTION 2.

This section of the interview involves some questions concerning your *attitudes to wildlife.* There are no right or wrong answers, and please do not think your views will be negatively or positively judged in any way. For this part of the questionnaire each of the questions are in the form of a statement. Please indicate on a scale from 1 to 5 the extent to which you disagree or agree with the statements.

Strongly Disagree	Moderately Disagree	Neither/ Nor	Moderately Agree	Strongly Agree
1	2	3	4	5

		Disagree				Agree
	(Please circle ONE number only)	**1**	**2**	**3**	**4**	**5**
1.	I would support wildlife if it did not restrict what I can do on my land.	1	2	3	4	5
2.	Cassowaries symbolise to me the beauty of nature.	1	2	3	4	5
3.	Wildlife like goannas and white ants are of little value to nature.	1	2	3	4	5
4.	A healthy cassowary population represents a healthy environment.	1	2	3	4	5
5.	I would support the harvesting wildlife for their meat so long as the animal is not endangered.	1	2	3	4	5
6.	I am repulsed by spiders.	1	2	3	4	5
7.	I like seeing wallabies and butterflies but I have little interest in learning about their biology.	1	2	3	4	5
8.	I see little wrong in using pig traps even though they may also capture cassowaries.	1	2	3	4	5
9.	I would support the filling in of wetlands if the land could be used to produce more jobs and income.	1	2	3	4	5
10.	I generally like animals the most that have some practical value.	1	2	3	4	5
11.	I believe a person must demand strict obedience and mastery over animals.	1	2	3	4	5
12.	My love for animals is amongst my strongest feelings.	1	2	3	4	5

7

	(Please circle ONE number only)	Disagree 1	2	3	4	Agree 5
13.	I regard any kind of recreational hunting as cruel to animals.	1	2	3	4	5
14.	I have little desire to walk in the forest just to see a cassowary.	1	2	3	4	5
15.	When camping, I prefer to stay in a modern campground more than in isolated areas where there might be wild animals near by.	1	2	3	4	5
16.	The idea of loving cassowaries strikes me as a strange emotion.	1	2	3	4	5
17.	I am afraid of snakes.	1	2	3	4	5
18.	Cassowaries are dangerous, so I prefer to stay away from them.	1	2	3	4	5
19.	I am fascinated by cassowary behaviour.	1	2	3	4	5
20.	I approve of protecting wildlife even if it hurts the economic livelihood of people who make a living off the land.	1	2	3	4	5
21.	If given the choice between seeing a beautiful animal like a domestic cat in the wild and an unattractive animal like a white tailed rat, I would much prefer to see the cat.	1	2	3	4	5
22.	Capturing cassowaries strikes me as a very exciting and challenging thing to do.	1	2	3	4	5
23.	I think the keeping of cassowaries as pets would result in them suffering.	1	2	3	4	5
24.	If populations of cassowaries are plentiful enough, I see little reason why they should not be hunted for their meat.	1	2	3	4	5
25.	If given a choice between conserving cassowaries and raising our standard of living, I would choose to raise our standard of living.	1	2	3	4	5
26.	I believe that if cassowaries are known to exist on this property, environmentalists will use this information to restrict clearing.	1	2	3	4	5
27.	I would accept any restrictions on land use activity due to cassowaries.	1	2	3	4	5
28.	I have little desire to encounter a cassowary because their behaviour is unpredictable.	1	2	3	4	5

8

SECTION 3.

To help us to better understand your views about wildlife, we would like to learn a bit more about the *nature and extent of your knowledge*. Do not be concerned if you do not know the answers to some of these questions.

A. Firstly, if you were to **compare yourself with other members of the community**, we would like you to tell us, by rating yourself on a scale from 1 to 5, how **knowledgeable** you consider yourself to be regarding environment and wildlife, conservation issues and cassowaries.

		I know very little				I know a lot
	(Please circle ONE number only)	**1**	**2**	**3**	**4**	**5**
1.	How much do you **know** about the environment and wildlife of the Wet Tropics.	1	2	3	4	5
2.	How much do you **know** about conservation issues in the Wet Tropics.	1	2	3	4	5
3.	How much do you **know** about cassowaries?	1	2	3	4	5

B. Secondly, you may have heard or read many different things about wildlife in this region. Based on what you know, please indicate whether you **think** each of the following statements is true or false.

		True	False	Don't Know
	(Please circle ONE only)	**T**	**F**	**DK**
1.	Dogs are capable of killing adult cassowaries.	T	F	DK
2.	Hunting crocodiles is legal.	T	F	DK
3.	On private property people are allowed to do what they like to cassowaries.	T	F	DK
4.	The crocodile population has increased rapidly in the last year in all of the local rivers around Mission Beach.	T	F	DK
5.	The major food item for goannas is bird eggs.	T	F	DK
6.	The cassowary numbers are the same now as they have always been in most of the areas where they are known to have lived.	T	F	DK

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		True	False	Don't Know
7.	Cats are responsible for killing a lot of native birds and animals.	T	F	DK
8.	People are allowed to collect and hold captive reptiles caught on private property.	T	F	DK
9.	Cassowaries occupy an area of about one acre of rainforest which forms their total home range area.	T	F	DK
10.	People who shoot cassowaries will be jailed.	T	F	DK
11.	There has been an overall increase in the rainforest frog population in the wet tropics during the last five years.	T	F	DK
12.	A number of tree species rely solely on cassowaries for the long distance dispersal of their seeds.	T	F	DK
13.	The white tailed rat is an introduced species to the Australian environment.	T	F	DK
14.	The life span of a cassowary is five years in the wild.	T	F	DK
15.	Crocodiles are very caring of their young, guarding the nest site and protecting the young once they are hatched.	T	F	DK
16.	At least 500 adult cassowaries live in the 40 sqkm Mission Beach coastal area.	T	F	DK
17.	The cassowaries natural food source is available only in rainforest.	T	F	DK
18.	The venom of the brown tree snake is capable of killing an adult person.	T	F	DK
19.	Cassowary chicks can protect themselves against dogs.	T	F	DK
20.	Any snake can be killed by people under any circumstances.	T	F	DK
21.	Cassowary chicks can be removed from the wild and placed in captivity for tourist viewing.	T	F	DK
22.	White ants are responsible for recycling nutrients into the ground.	T	F	DK
23	Cassowaries are found in the rainforests of all of the States of Australia.	T	F	DK
24.	All butterflies in the wet tropics lay their eggs on the leaves of any tree species.	T	F	DK
25.	Cassowaries, like emus, live in large social groups.	T	F	DK

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C. Thirdly, we are interested in **where** you obtain your **information** about the environment, wildlife and conservation issues from.

1. Please rate the following **information sources** on a scale from 1 to 5 according to how **important** they have been to you as sources of information about the environment, wildlife and conservation issues.

		Not Important				Very Important
	(Please circle ONE number only)	**1**	**2**	**3**	**4**	**5**
A.	**Government Agencies**					
a.	National Parks	1	2	3	4	5
b.	Forestry Service	1	2	3	4	5
c.	Wet Tropics Management Agency	1	2	3	4	5
d.	Department of Primary Industry	1	2	3	4	5
e.	Universities	1	2	3	4	5
B.	**Local Sources**					
f.	Peers (neighbours, friends, other farmers, relatives)	1	2	3	4	5
g.	Cassowary information centre, Mission Beach	1	2	3	4	5
h.	Other conservation organisations	1	2	3	4	5
i.	Personal experience	1	2	3	4	5
j.	Scientists	1	2	3	4	5
C.	**Mass Media**					
k.	Newspapers	1	2	3	4	5
l.	Radio	1	2	3	4	5
m.	Magazines	1	2	3	4	5
n.	Books	1	2	3	4	5
o.	TV	1	2	3	4	5

2.	Have you ever **visited** a National Parks, Forestry Service, Wet Tropics or a Conservation Organisation Information Centre? **(Please circle ONE only)**	**YES**	**NO**
3.	If **YES**		
a)	**When** did you last visit such a Centre?	**DATE:** (approx) ____/____/____	
b)	**Which** Centre?	**AGENCY:** _____	
c)	**Where?**	**LOCATION:**_____	
	_____		

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4. We are interested in your **assessment** of these information sources. From your experience in accessing these information sources could you please rate them on a scale from 1 to 5 according to the following criteria, level of **knowledge/expertise, availability,** and **local relevance** with regards to the environment, wildlife and conservation issues.

a) Level of **knowledge/expertise**

	(Please circle ONE number only)	Least knowledgeable 1	2	3	4	Most knowledgeable 5
A.	**Government Agencies**					
a.	National Park	1	2	3	4	5
b.	Forestry Service	1	2	3	4	5
c.	Wet Tropics Management Agency	1	2	3	4	5
d.	Department of Primary Industry	1	2	3	4	5
e.	Universities	1	2	3	4	5
B.	**Local Sources**					
f.	Peers (neighbours, friends, other farmers, relatives)	1	2	3	4	5
g.	Cassowary information centre, Mission Beach	1	2	3	4	5
h.	Other conservation organisations	1	2	3	4	5
i.	Personal experience	1	2	3	4	5
j.	Scientists	1	2	3	4	5
C.	**Mass Media**					
k.	Newspapers	1	2	3	4	5
l.	Radio	1	2	3	4	5
m.	Magazines	1	2	3	4	5
n.	Books	1	2	3	4	5
o.	TV	1	2	3	4	5

b) Level of **availability**

	(Please circle ONE number only)	Least available 1	2	3	4	Most available 5
A.	**Government Agencies**					
a.	National Parks	1	2	3	4	5
b.	Forestry Service	1	2	3	4	5
c.	Wet Tropics Management Agency	1	2	3	4	5
d.	Department of Primary Industry	1	2	3	4	5
e.	Universities	1	2	3	4	5
B.	**Local Sources**					
f.	Peers (neighbours, friends, other farmers, relatives)	1	2	3	4	5
g.	Cassowary information centre, Mission Beach	1	2	3	4	5
h.	Other conservation organisations	1	2	3	4	5
i.	Personal experience	1	2	3	4	5
j.	Scientists	1	2	3	4	5

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		Least available 1	2	3	4	Most available 5
C.	**Mass Media**					
k.	Newspapers	1	2	3	4	5
l.	Radio	1	2	3	4	5
m.	Magazines	1	2	3	4	5
n.	Books	1	2	3	4	5
o.	TV	1	2	3	4	5

c) Level of **local relevance**

(Please circle ONE number only)

		Least locally relevant 1	2	3	4	Most locally relevant 5
A.	**Government Agencies**					
a.	National Parks	1	2	3	4	5
b.	Forestry Service	1	2	3	4	5
c.	Wet Tropics Management Agency	1	2	3	4	5
d.	Department of Primary Industry	1	2	3	4	5
e.	Universities	1	2	3	4	5
B.	**Local Sources**					
f.	Peers (neighbours, friends, other farmers, relatives)	1	2	3	4	5
g.	Cassowary information centre, Mission Beach	1	2	3	4	5
h.	Other conservation organisations	1	2	3	4	5
i.	Personal experience	1	2	3	4	5
j.	Scientists	1	2	3	4	5
C.	**Mass Media**					
k.	Newspapers	1	2	3	4	5
l.	Radio	1	2	3	4	5
m.	Magazines	1	2	3	4	5
n.	Books	1	2	3	4	5
o.	TV	1	2	3	4	5

5. Have you had a chance to read the information leaflet from the Community for Coastal and Cassowary Conservation which was delivered to your house recently? **YES** **NO**

6. Do you intend to become a member of this organisation? **YES** **NO**

7. If **YES**, what do you think would be the extent of your involvement?

a) financial member only _____

b) wish to attend meetings _____

c) volunteer at the environment centre _____

d) become involved in a working group _____

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SECTION 4.

In this next section our questions are all related to a wildlife species which you may or may not be familiar with, the cassowary. Here we are particularly interested in your *own views* on this species. Again there are no right or wrong answers but we are interested in your personal *beliefs and feelings* about cassowaries.

Unlike the previous two sections, the answers required here will be a mixture of formats. We will guide you through the questions and the required answer format slowly and carefully so as to avoid confusion. The best way to answer the following group of questions is to put yourself in the position of having to describe a cassowary to someone from overseas who has never heard of cassowaries. What would you say? Please try to give him or her as much information as possible by answering the following questions.

A. Firstly, in order to provide a **general overall description** of cassowaries, you might wish to compare them to other animals and to provide information on their size and movements. Considering these features, how would you best describe cassowaries? **(Please tick ONE only).**

1. The closest biological relative of the cassowary is the:

a) Scrub Turkey _____
b) Sulphur crested cockatoo _____
c) Wallaby _____
d) Torres Strait Pigeon _____
e) Emu _____

2. A mature adult female cassowary can weigh up to:

a) 5 kg _____
b) 25 kg _____
c) 50kg _____
d) 75kg _____
e) 100kg _____

3. Cassowaries can grow to a maximum head height of:

a) 50cm (0.5m) _____
b) 100cm (1.0m) _____
c) 200cm (2.0m). _____
d) 300cm (3.0m) _____
e) 500cm (5.0m) _____

4. The maximum distance that I believe cassowaries can travel each day is:

a) 0.5km _____
b) 1km _____
c) 5km _____
d) 100km _____
e) 1000km _____

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B. Secondly, people often think of cassowaries in terms of their physical attractiveness, intelligence, and how dangerous they are. One way of considering these characteristics is to compare cassowaries with other animals. Please rate cassowaries, along with the following list of animals, on a scale from 1 to 5, according to their physical **attractiveness**, **intelligence**, and how **dangerous** they are.

5. How **attractive** do you consider these animals to be?

	unattractive				**attractive**
(Please circle ONE number only)	**1**	**2**	**3**	**4**	**5**
White tailed rat	1	2	3	4	5
Butterfly	1	2	3	4	5
Goanna	1	2	3	4	5
Cassowary	1	2	3	4	5
Crocodile	1	2	3	4	5
Snake	1	2	3	4	5
Wallaby	1	2	3	4	5
Dog	1	2	3	4	5
Pig	1	2	3	4	5
Spider	1	2	3	4	5
Cat	1	2	3	4	5

6. How **intelligent** (how **smart**) do you consider these animals to be?

	unintelligent				**intelligent**
(Please circle ONE number only)	**1**	**2**	**3**	**4**	**5**
White tailed rat	1	2	3	4	5
Butterfly	1	2	3	4	5
Goanna	1	2	3	4	5
Cassowary	1	2	3	4	5
Crocodile	1	2	3	4	5
Snake	1	2	3	4	5
Wallaby	1	2	3	4	5
Dog	1	2	3	4	5
Pig	1	2	3	4	5
Spider	1	2	3	4	5
Cat	1	2	3	4	5

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7. How **dangerous** do you consider these animals to be?

(Please circle ONE number only)	Not at all Dangerous 1	2	3	4	Very Dangerous 5
White tailed rat	1	2	3	4	5
Butterfly	1	2	3	4	5
Goanna	1	2	3	4	5
Cassowary	1	2	3	4	5
Crocodile	1	2	3	4	5
Snake	1	2	3	4	5
Wallaby	1	2	3	4	5
Dog	1	2	3	4	5
Pig	1	2	3	4	5
Spider	1	2	3	4	5
Cat	1	2	3	4	5

8. How would you rate the extent to which each of the following animals is at **risk** in terms their survival .

(Please circle ONE number only)	Not at Risk 1	2	3	4	Greatly at Risk 5
White tailed rats	1	2	3	4	5
Butterflies	1	2	3	4	5
Goannas	1	2	3	4	5
Cassowaries	1	2	3	4	5
Crocodiles	1	2	3	4	5
Snakes	1	2	3	4	5
Wallabies	1	2	3	4	5

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C. Thirdly, this overseas visitor is very interested in your **personal feelings** toward cassowaries. Could you please explain these **feelings** within the format of the following instructions.

9. In your own words, how would you describe your **personal feelings** about cassowaries ?

10. Please specify the **nature** and **intensity** of these **feelings** by using the items and scales below. For example,

if you **disliked** cassowaries to some extent you would circle the number **2**

if you **really liked** cassowaries you would circle the number **5**

Disike	1	2	3	4	5	Like
Frightened	1	2	3	4	5	Comfortable
Indifferent	1	2	3	4	5	Fascinated
Nothing special	1	2	3	4	5	Priviledged
Bored	1	2	3	4	5	Excited
Sad	1	2	3	4	5	Happy
Distressed	1	2	3	4	5	Pleased
Worthless	1	2	3	4	5	Valuable

11. So that we can relate these feelings to other things, could you explain what **thoughts** or **images** come to mind when you think of cassowaries. For example, some animals or plants or places often make us think of other things - a kangaroo, for example, might make us think of Australia. What do cassowaries make you think of?

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12. We would like you now to try and explain in your own words your **understanding** of the Wet Tropic's ecosystem, i.e.**what it is and how it functions**? This is a difficult question, but try and answer it as simply and directly as you can, as if you were explaining it to this overseas visitor.

13. What **role** do you think cassowaries play in this ecosystem? Try and be as specific as possible.

D. Fourthly, in order to explain to the overseas visitor the **problems** cassowaries face, you may need to consider how serious a threat the following problems are: (please add any other threats if not listed)

14. Indicate on a scale from 1 to 5 how important you believe each of the following **possible threats** are to cassowaries.

(Please circle ONE number only)	**No Threat** 1	2	3	4	**Greatest Threat** 5
Dog attack	1	2	3	4	5
Shooting	1	2	3	4	5
Habitat Clearing	1	2	3	4	5
Crossing Roads	1	2	3	4	5
Pig Traps	1	2	3	4	5
Habitat Fragmentation	1	2	3	4	5
Fences	1	2	3	4	5
Other (Please specify)_____	1	2	3	4	5

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15. Of the situations that you have rated to be the **greatest threats** from the above list, could you please explain why you believe them to be as serious as you have indicated. (Explanations for the two greatest threats is sufficient).

_____

_____

_____

_____

_____

E. We are also trying to assess whether respondents have ever had the opportunity to personally **engage in activities** that might help to alleviate the threats we have been considering.

16. Have you ever **engaged in any such activity?** **YES** **NO**

17. If **YES,** a) Could you please describe these activities?

_____

_____

_____

_____

_____

_____

_____

b) What do you think prompted you to become engaged in the activities you have described?

_____

_____

_____

_____

_____

_____

_____

18. Of the following list of activities could you please tick the ones you have engaged in.
Please list others if they have not been given.

a) Personally informing people about the threats/issues. _____

b) Direct involvement in activities. _____

c) Participation in groups/organisations. _____

d) Lobby Government Agencies/Councils to appropriately address the threats/issues by letter writing, meetings etc. _____

e) Others, please specify..... _____

_____

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19. How likely is it that you would engage in the following activities?

(Please circle ONE number only)	Not Likely at all 1	2	3	4	Very Likely 5
I would participate in a demonstration against companies that are harming the environment.	1	2	3	4	5
I would contribute money to environmental organisations.	1	2	3	4	5
I would sign a petition in support of tougher environmental laws.	1	2	3	4	5
I would take a job with a company I knew was harming the environment.	1	2	3	4	5

20. Considering the community in which you live as a whole, do you think that most people would consider themselves to be environmentalists? **Yes** **No**

21. Please explain your answer?

---

22. Do you think that your own opinions and/or behaviour have been influenced by the attitudes of other people in the Community? **Yes** **No**

23. If you have **not** engaged in any activities that might alleviate the threats to cassowaries, could you please explain why not?

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24	Would you consider yourself an environmentalist? Please rate your response on a scale from 1 to 5.				
	Not at all				**Very much so**
	1	**2**	**3**	**4**	**5**

25. Can you please explain your response?

_____

_____

_____

_____

_____

26. What do you consider the **current population** of adult cassowaries in the wild to be here in Australia? **(Please tick ONE only)**

a) Less than 100 _____

b) 100 - 1999 _____

c) 2000- 4999 _____

d) 5000 - 9999 _____

e) More than 10000 _____

F. The following statements are frequently heard about the cassowary population here in Australia. You need to describe to this overseas visitor what you consider the current situation to be. In order to do this, please indicate on a scale from 1 to 5 how much you **disagree or agree** with each of the statements.

		Disagree				**Agree**
	(Please circle ONE number only)	**1**	**2**	**3**	**4**	**5**
27.	The survival of cassowaries in the wild is severely threatened.	1	2	3	4	5
28.	Habitat loss is the major threat to the survival of cassowaries.	1	2	3	4	5
29.	In some areas of North Queensland, localised extinction of cassowaries has already occured.	1	2	3	4	5
30.	If habitat continues to be cleared, cassowaries will become extinct.	1	2	3	4	5

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SECTION 5.

In order to better understand the feelings you have about cassowaries, we would like to ask some questions which look at the *nature and extent of your direct experience* with this species.

1. Have you ever heard of, read about or seen a TV program about cassowaries? **YES** **NO**

2. Have you seen a cassowary in the wild? **YES** **NO**

3. When was the last time you saw one? **DATE** (approx) _____/_____/_____

4. Where did you see it?_____

5. Was it? **(Please tick one only)**

   a) An adult _____
   b) A subadult _____
   c) An adult with chicks _____

6. Over a period of 12 months prior to this last sighting, how often would you have seen cassowaries? **(Please tick ONE only)**

   a) Very regularly (every month) _____
   b) Regularly (every 2 months) _____
   c) Occasionally (twice per year) _____
   d) Rarely (once a year) _____
   e) Never _____

7. Have you ever had any encounters with cassowaries other than just seeing them? **YES** **NO**

8. If **YES,** please described what happened.

_____

_____

_____

_____

_____

_____

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9. From your experience in these encounters, please rate cassowaries on a scale from 1 to 5 according to the following characteristics. If you haven't had any encounters please indicate what you believe cassowaries to be like.

For example, if you consider cassowaries are very **bad**, circle **1**
if you consider cassowaries are very **good**, circle **5**

Bad	1	2	3	4	5	Good
Pest	1	2	3	4	5	Valuable
Dangerous	1	2	3	4	5	Harmless
Wild	1	2	3	4	5	Tame
Strong	1	2	3	4	5	Weak
Familiar	1	2	3	4	5	Wary
Dependent	1	2	3	4	5	Independent

10. In a survey conducted by the Wet Tropics Management Agency, 37% of respondents nominated the cassowary as the species they principally associate with the Wet Tropics area. Why do you think this is so?

_____

_____

_____

_____

_____

11. The Wet Tropics are using the following depictions of a cassowary as their mascot. What do you think of this idea? Please rate your response on a scale from 1 to 5.

Not very appropriate **Very appropriate**

1 **2** **3** **4** **5**

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12. We understand that the North Queensland community has and will continue to be affected by the listing of the Wet Tropics and other conservation initiatives. These include the Forestry Service Reforestation Programs, the Consultative Committee for Cassowary Conservation (C4), the Douglas Shire Proposed Growth Limit, and the National Parks Community Conservation Programs. There is, as well, the Tully-Millstream Dam proposal. It would be useful to obtain your considered opinion of whether the benefits of these programs/schemes outweigh possible costs to the human population in terms of economics, inconvenience, etc. Please rate your opinion of this for each of the above on a scale from 1 to 5.

Harmful, with costs substantially outweighing benefits ... **Valuable, despite possible costs**

1 2 3 4 5

	Wet Tropics Listing	1	2	3	4	5
	Forestry Service Reforestation Program	1	2	3	4	5
	National Parks Community Conservation Programs	1	2	3	4	5
	Douglas Shire Growth Limit	1	2	3	4	5
	Consultative Committee for Cassowary Conservation (C4)	1	2	3	4	5
	Tully Millstream Dam Proposal	1	2	3	4	5

SECTION 6

To finish off this survey we would appreciate if you could give us a little information about *yourself* and *your background*. The questions are very straight forward and allows us to assess whether respondents differ according to gender, age, or occupation.

1. Gender **MALE** **FEMALE**

2. How old are you? _____**years**

3. What is the **highest level of education** you have received? **(Please tick ONE only)**

a) Primary School _____
b) High School _____
c) TAFE _____
d) University _____
e) Other nonuniversity education _____
Please specify_____
f) Presently a student _____
Please specify_____

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4. Do you rent/lease or own this property? **(Please tick ONE only)**

a) Rent/lease _____

b) Own _____

5. Approximately how many acres are included in this property? _____acres

6. How long have you lived here? _____months **OR** _____years

7. What is your current occupation ?_____

8. In which of the following categories would your family's **total income** fall?
(Please tick ONE only)

a)	Under $10,000	_____	d)	$30,000 - $39,999	_____
b)	$10,000 - $19,999	_____	e)	$40,000 - $49,999	_____
c)	$20,000 - $29,999	_____	f)	over $50,000	_____

9. How many dependent family members do you have? _____

10. Do you belong to any community/business organisations? **Yes** **No**

11. If **YES**, please list the names under the categories of organisations listed.

a) Service Clubs _____

b) Business Organisations _____

c) Tourist Organisations _____

d) Farmers Organisations _____

e) Conservation Organisations_____

f) Others, specify _____

The next couple of questions are only to be answered by the rural population.

12. Do you earn an income from this property? **YES** **NO**

13. Is this your major income source? **YES** **NO**

14. Please identify the major agricultural activity on this property. _____

15. How extensive is your farming activity in terms of area of property under cultivation? _____acres.

Thank you very much for your time and co-operation in completing this questionnaire. Your responses will help us to better understand what types of inititatives are necessary for obtaining Community support and involvement in caring for the environment of North Queensland.

Appendix B.1.4: Dominant Social Paradigm (DSP) Dimensions

1.	Laissez-faire Government	support for the policy of limited government and fear of planning
2.	Status Quo	support for the status quo
3.	Private Property Rights	devotion to the rights of private landowners.
4.	Science and Technology	faith in the efficacy of science and technology.
5.	Individual Rights	emphasis upon individualism.
6.	Economic Growth	faith in the indefinite growth of the economy.
7.	Material Abundance	endorsing a strong valuation on material wealth.
8.	Future Prosperity	faith in the future in terms of wealth, growth and prosperity.

Appendix B.1.5 : New Environmental Paradigm (NEP) Dimensions

1.	Balance of Nature	need to preserve the balance of nature.
2.	Limits to Growth	the belief that growth should be limited.
3.	Humanity over Nature	the notion that humans are not part of but rather the rulers of nature.

Appendix B.1.6 : Stern's Beliefs about Consequences Subscales

1.	Egoistic	belief in the consequences for the self, self-interest.
2.	Social-altruistic	concern for the welfare of other human beings.
3.	Biospheric	concern with non human species or the biosphere.

Appendix B.1.7 : Kellert's Wildlife Attitude Typologies.

1.	Aesthetic	primary focus on the physical attractiveness and symbolic appeal of wildlife.
2.	Libertarian/ Dominionistic	strong interest in individual rights and freedoms and in mastery, control and domination of wildlife
3.	Ecologistic	primary concern for the environment as a system and for interrelationships between wildlife species and natural habitats.
4.	Humanistic	primary focus on strong emotional attachment to and support for the existence value of wildlife species.
5.	Moralistic	strong concern for the possible infliction of cruelty, harm and exploitation of wildlife.
6.	Naturalistic	primary emphasis on the direct experience of wildlife in an outdoor recreational setting.
7.	Scientistic	primary focus on physical attributes and biological functioning of animals.
8.	Utilitarian - Consumption	primary interest in the practical value of animals.
9.	Utilitarian - Habitat	primary interest in the practical human value of land associated with wildlife.

Appendix B.1.8 : Assessment Of Knowledge Questions

INFORMATION SHEET

Notes to Participants

The questionnaire which you are being requested to participate in forms part of a larger survey instrument designed to explore people's responses to the North Australian natural environment, a part of my PhD research project. It addresses the nature and extent of the respondents knowledge about the environment and wildlife, conservation issues and cassowaries. Since the questions I have put together have not been assessed by anyone other than myself I am requesting your assistance in this. Your role is to assist in evaluating these questions according to two main criteria :
a) *knowledge category* assessment, b) *nature of questions.*

This assessment will allow me to alter or modify the questions according to the information received and hence maximise their effectiveness within the final survey instrument.

The information provided will guide you through the assessment process. The package consists of the following:

Instructions

1. Read carefully all of the **Sheets** provided.
2. Proceed through the **Questionnaire** answering each of the questions according to the instructions provided.
3. As you are doing so assess these questions according to the two criteria,
   a) *knowledge category,* and b) *nature of the questions.* In order to make this assessment follow carefully the definitions provided on the **Definition Sheet.**
4. Record the results of this assessment on the **Response Sheet** provided together with the additional information requested.

THANK YOU FOR YOUR ASSISTANCE. Joan Bentrupperbäumer

Appendix B.1.8 (Cont.....)

RESPONSE SHEET

Section 1 **Respondent Information**

Name	:.....
Age	:.....
Education Level	:.....
Biology Background	:.....

Section 2 **Knowledge Category Assessment**

Please list out the question numbers according to the category (as per definition Table 1) to which you believe each belongs.

	Knowledge Category	QUESTION NUMBERS General Wildlife	Cassowaries
A	Biological Knowledge	.....	.....
B	Ecological Knowledge	.....	.....
C	Issue Awareness	.....	.....
D	Action Strategy Awareness	.....	.....
E	Population Status Awareness	.....	.....
G	Don't Know	.....	.....

Appendix B.1.8 (Cont.....)

Section 3 Nature of Questions

Please list out the numbers of any questions you believe are too difficult or confusing (as per definition Table 2).

	Question Category	Question Numbers
A	Difficult Questions	....
B	Confusing Questions	....

Section 4 General Information

Please record any additional information you believe relevant to this questionnaire.

Appendix B.1.2 (Cont.....)

DEFINITION SHEET

Table 1 : Knowledge Category Definitions.

	Knowledge Category	Definition
A	Biological Knowledge	Knowledge of basic biology of wildlife and cassowaries.
B	Ecological Knowledge	Knowledge of basic principles or relationships between wildlife/cassowaries and nature.
C	Issue Awareness	Awareness of issues and problems associated with the conservation and survival of wildlife/cassowaries.
D	Action Strategy Awareness	Awareness of wildlife/cassowary management policies/regulations.
E	Population Status Awareness	Awareness of the present status of wildlife/cassowary populations.

Table 2 Definitions of the Nature of Questions

	Nature of Questions	Definitions
A	Difficult Questions	Questions that you find may be too difficult for the general public.
B	Confusing Questions	Questions that you find are not clearly worded and hence their meaning could be misinterpreted.

Appendix B.1.8 (Cont.....)

KNOWLEDGE QUESTIONNAIRE

Knowledge of Wildlife.

To help us better understand your views about wildlife, we would like to learn how much you know. Do not be concerned if you do not know the answers to some of these questions. Many people would not know the answers to many questions.

A. Firstly, we would like you to tell us how knowledgeable you think you are regarding wildlife.

1. How would you describe your knowledge about the wildlife of the Wet Tropics in comparison to others in the community? **(circle one number that best corresponds to what you believe your level of knowledge to be.)**

Know Nothing	Know a little	Average Knowledge	Know a lot	Know Everything
1	2	3	4	5

2. How would you describe your knowledge of the conservation issues in the Wet Tropics? **(circle one number that best corresponds to what you believe your level of knowledge to be.)**

Know Nothing	Know a little	Average Knowledge	Know a lot	Know Everything
1	2	3	4	5

3. How much do you know about cassowaries?

Know Nothing	Know a little	Average Knowledge	Know a lot	Know Everything
1	2	3	4	5

Appendix B.1.8 (Cont.....)

B. Secondly, you may have heard or read many different things about wildlife of this region. Based on what you know, please indicate whether you think each of the following statements are true or false.

T = True; F = False; DK = Don't Know

1.	Dogs are capable of killing adult cassowaries.	T	F	DK
2.	Hunting crocodiles is legal.	T	F	DK
3.	The diet of feral pigs of the Wet tropics region is mainly bird eggs and carrion.	T	F	DK
4.	On private property people are allowed to do what they like to cassowaries.	T	F	DK
5.	The crocodile population has increased rapidly in the last year in all of the local rivers around Mission Beach.	T	F	DK
6.	Cassowaries are important to the forests because germination of all seeds depends on them being processed by movement through their gut.	T	F	DK
7.	A major food item for goannas is bird eggs.	T	F	DK
8.	The cassowary numbers are the same now as they have always been in all of the areas where they are known to have lived.	T	F	DK
9.	Cats are responsible for killing a lot of native birds and animals.	T	F	DK
10.	People are allowed to collect and hold captive reptiles caught on private properties.	T	F	DK
11.	Cassowaries occupy an area of about 1 acre of rainforest which forms their total home range area.	T	F	DK
12.	Some spiders play an important role in assisting in the pollination of certain flowers.	T	F	DK
13.	People who shoot cassowaries will be jailed.	T	F	DK
14.	There has been an overall increase in the rainforest frog population in the Wet Tropics during the last five years.	T	F	DK
15.	A number of tree species rely solely on cassowaries for the long distance dispersal of their seeds.	T	F	DK
16.	The white tailed rat is a introduced species to the Australian environment.	T	F	DK
17.	The life span of a cassowary is five years in the wild.	T	F	DK
18.	Crocodiles are similar to some birds in that the nest site for their eggs is a mound of soil and vegetation.	T	F	DK
19.	At least 500 adult cassowaries live in the 40sq km Mission Beach coastal area.	T	F	DK
20.	There are no endangered species in the Wet Tropics region.	T	F	DK
21.	The cassowary's natural food source is available only in the rainforest.	T	F	DK
22.	The venom of the brown tree snake is capable of killing an adult person.	T	F	DK
23.	Cassowary chicks are regularly eaten by feral pigs.	T	F	DK
24.	Any snake can be killed under any circumstances.	T	F	DK
25.	Cassowary chicks can be removed from the wild and placed in captivity for tourist viewing.	T	F	DK
26.	White ants are responsible for recycling nutrients into the ground.	T	F	DK
27.	Cassowaries do not need forests to survive, they can live exclusively in open grasslands.	T	F	DK
28.	All butterflies in the Wet Tropics lay their eggs on the leaves of any tree species.	T	F	DK
29.	During the last five years the cassowary population has increased rapidly in the lowland coastal region of the Wet Tropics.	T	F	DK
30.	Cassowaries need the forests for their supply of food, water and shelter.	T	F	DK

APPENDIX B. 2

Analyses: **Attitudes and Environmental Information Base**

Appendix B.2.1: *Attitude toward Cassowaries* Scale.

Attitude Components	Attitude Items	Survey Instrument Location
Cognitive	I see little wrong with using pig traps even though they may also capture cassowaries.	Section 2 Qs.8. (Kellert Scale)
	Cassowaries are dangerous so I prefer to stay away from them.	Section 2 Qs.18. (Kellert Scale)
	Capturing cassowaries strikes me as a very challenging and exciting thing to do.	Section 2 Qs.22. (Kellert Scale)
	I think the keeping of cassowaries as pets would result in them suffering.	Section 2 Qs.23. (Kellert Scale)
	If populations of cassowaries are plentiful enough I see little reason why they should not be hunted for their meat.	Section 2 Qs.24. (Kellert Scale)
	A healthy cassowary population represents a healthy environment.	Section 2 Qs.4. (Kellert Scale)
	How **attractive** do you consider cassowaries to be?	Section 4B Qs.5.
	How **intelligent** do you consider cassowaries to be?	Section 4B Qs.6.
Affective	Cassowaries symbolise to me the beauty of nature.	Section 2 Qs.2. (Kellert Scale)
	A healthy cassowary population represents a healthy environment.	Section 2 Qs.4. (Kellert Scale)
	I have little desire to walk in the forest just to see a cassowary.	Section 2 Qs.14. (Kellert Scale)
	I am fascinated by cassowary behaviour.	Section 2 Qs.19. (Kellert Scale)
	I have little desire to encounter a cassowary because their behaviour is unpredictable.	Section 2 Qs.28. (Kellert Scale)
	Please specify the nature and intensity of your feelings for cassowaries by using the items and scales below. dislike.....like frightened .....comfortable indifferent .....fascinated nothing special .....privileged bored .....excited	Section 4C. Qs10.
Conative	If given the choice between conserving cassowaries and raising our standard of living, I would choose to raise our standard of living.	Section 2 Qs.25. (Kellert Scale)
	I would accept any restrictions on land use due to cassowaries.	Section 2 Qs.27. (Kellert Scale)

Appendix B.2.2: *Attitude toward 'Other' Wildlife* Scale.

Attitude Components	Attitude Items	Survey Instrument Location
Cognitive	Wildlife like goannas and white ants are of little value to nature.	Section 2 Qs.3. (Kellert Scale)
	I believe a person must demand strict obedience and mastery over animals.	Section 2 Qs.11. (Kellert Scale)
	I regard any kind of recreational hunting as cruel to animals.	Section 2 Qs.13. (Kellert Scale)
	How **attractive** do you consider wallabies to be?	Section 4B Qs.5.
	How **intelligent** do you consider wallabies to be?	Section 4B Qs.6.
Affective	I like seeing wallabies and butterflies but I have little interest in learning about their biology.	Section 2 Qs.7. (Kellert Scale)
	I generally like animals the most that have some practical value.	Section 2 Qs.10. (Kellert Scale)
	My love for animals is amongst my strongest feelings.	Section 2 Qs.12. (Kellert Scale)
	When camping I prefer to stay in a modern camp ground more than in isolated areas where there might be wild animals near by.	Section 2 Qs.15. (Kellert Scale)
	I am afraid of snakes.	Section 2 Qs.17. (Kellert Scale)
Conative	I would support wildlife if it did not restrict what I can do on my land.	Section 2 Qs.1. (Kellert Scale)
	I would support harvesting wildlife for their meat so long as the animal is not endangered.	Section 2 Qs.5. (Kellert Scale)
	I would support the filling of wetlands if the land could be used to produce more jobs and income.	Section 2 Qs.9. (Kellert Scale)
	I approve of protecting wildlife even if it hurts the economic livelihood of people who make a living off the land.	Section 2 Qs.20. (Kellert Scale)

Appendix B.2.3: Intercorrelation Matrix for *Attitude toward Cassowaries.*

Attitude Components	**Composite Attitude Score**	Cognitive	Affective	Conative
Cognitive	**0.79** r^2 **= 0.62** ***	1		
Affective	**0.92** r^2 **= 0.85** ***	**0.54** ***	1	
Conative	**0.66** r^2 **= 0.43** ***	**0.44** **	**0.48** ***	1

Note: * **= Significant at 0.05.** ** **= Significant at 0.01.**
*** **= Significant at 0.001**

1) Main entry in each cell is Pearson's correlation coefficient r.
2) The square of Pearson's correlation coefficient (r^2) is presented in column 2 in addition to Pearson's r.
3) Shaded cells refer to dimension- total score correlations.
4) Bold face identifies statistically significant relationships.
5) Asterisks identifies level of significance.

Appendix B.2.4: Resident community differences in *Attitude toward Cassowaries.*

Attitude Components	Rural (N = 35)	Semiurban (N = 143)	Urban (N = 142)	**Total Study Population (N = 320)**	f	p
Cognitive Component (RR = 1-35)	27.96 (4.26)	28.23 (4.14)	26.99 (3.51)	**27.69 (4.16)**	3.35	0.036
Affective Component (RR = 1-50)	39.29 (7.88)	41.29 (6.29)	35.49 (6.94)	**38.50 (7.29)**	26.52	0.0001
Conative component (RR = 1-10)	6.43 (2.63)	6.64 (2.28)	6.54 (1.97)	**6.57 (2.18)**	0.15	0.860 NS
TOTAL Attitude Score (RR =1-95)	**73.69 (12.05)**	**76.16 (10.38)**	**69.01 (11.25)**	**72.72 (11.44)**	**15.29**	**0.000 1**

Note: **RR = Response Range** **NS = Not Significant**

1) Entries in columns 2 to 5 are response means, with standard deviations in parentheses.
2) Entries in columns 6 and 7 are f and p values from ANOVA analyses.
3) Shaded cells refer to total population and attitude scores.
4) N = Survey population size.

Appendix B.2.5: Education Level Differences in *Attitude toward Cassowaries.*

Attitude Components	Primary (n = 28)	Secondary (n = 129)	TAFE (n = 62)	University (n = 98)	f	p
Cognitive (RR = 1-35)	26.50 (4.19)	27.81 (4.46)	28.95 (3.89)	27.03 (3.71)	3.62	0.013
Affective (RR = 1-50)	36.57 (6.98)	39.22 (7.68)	40.58 (6.87)	36.73 (6.65)	4.88	0.003
Conative (RR = 1-10)	5.71 (1.92)	6.56 (2.30)	6.94 (2.19)	6.64 (2.06)	2.06	0.106 NS
TOTAL Attitude Score (RR =1-95)	**68.79 (10.65)**	**73.59 (12.13)**	**76.47 (11.19)**	**70.39 (10.17)**	**5.11**	**0.001**

Note: **RR = Response Range, NS = Not Significant**

1) Entries in columns 2 to 5 are response means, with standard deviations in parentheses.
2) Entries in columns 6 and 7 are f and p values from ANOVA analyses.
3) Shaded cells refer to total attitude scores.
4) N = Survey population size.

Appendix B.2.6: Income Level Differences in *Attitudes toward Cassowaries.*

Attitude Components	<10 n = 46	10<20 n = 36	20<30 n = 71	30<40 n = 51	40<50 n = 33	>50 n = 55	f	p
Cognitive (RR = 1-35)	27.65 (4.21)	28.19 (4.13)	27.99 (4.57)	27.29 (4.68)	27.24 (3.87)	27.29 (3.31)	0.43	0.829 NS
Affective (RR = 1-50)	40.74 (7.28)	40.56 (7.63)	39.30 (7.36)	36.45 (7.30)	37.45 (5.82)	36.42 (6.60)	3.66	0.003
Conative (RR = 1-10)	7.28 (2.07)	7.06 (2.39)	6.49 (2.28)	6.53 (2.25)	6.09 (1.94)	6.29 (2.02)	1.85	0.102 NS
TOTAL Attitude Score (RR =1-95)	**75.67 (10.97**	**75.81 (12.27**	**73.77 (12.14**	**70.27 (12.42**	**70.79 (9.16)**	**70.00 (9.91)**	**2.58**	**0.026**

Note: **RR = Response Range, NS = Not Significant**

1) Entries in columns 2 to 7 are response means, with standard deviations in parentheses.
2) Entries in columns 8 and 9 are f and p values from ANOVA analyses.
3) Shaded cells refer to total attitude scores.
4) N = Survey population size.

Appendix B.2.7: Intercorrelation Matrix for *Attitude toward 'Other' Wildlife.*

Attitude Components	**Composite Attitude Score**	Cognitive	Affective	Conative
Cognitive	**0.77** r^2 **= 0.59** ***	1		
Affective	**0.75** r^2 **= 0.56** ***	**0.35** ***	1	
Conative	**0.77** r^2 **= 0.59** ***	**0.47** ***	**0.31** **	1

Note: * **= Significant at 0.05.** ** **= Significant at 0.01.**
*** **= Significant at 0.001**

1) Main entry in each cell is Pearson's correlation coefficient r.
2) The square of Pearson's correlation coefficient (r^2) is presented in column 2 in addition to Pearson's r.
3) Shaded cells refer to dimension- total score correlations.
4) Bold face identifies statistically significant relationships.
5) Asterisks identifies level of significance.

Appendix B.2.8: Resident Community Differences in *Attitude toward 'Other' Wildlife.*

Attitude Components	Rural (N = 35)	Semiurban (N = 143)	Urban (N = 142)	**Total Study Population (N = 320)**	f	p
Cognitive Component (RR = 1-25)	19.31 (3.74)	19.73 (3.08)	19.92 (2.88)	**19.77 (3.07)**	0.55	0.576 NS
Affective Component (RR = 1-25)	17.94 (4.60)	17.91 (3.88)	16.44 (2.97)	**17.26 (3.66)**	6.68	0.001
Conative component (RR = 1-20)	12.03 (3.76)	12.21 (3.53)	12.85 (3.08)	**12.47 (3.37)**	1.61	0.125 NS
TOTAL Attitude Score (RR =1-70)	**49.29 (9.64)**	**48.85 (8.08)**	**49.20 (6.78)**	**49.50 (7.71)**	**0.27**	**0.762 NS**

Note: **RR = Response Range,** **NS = Not Significant**

1) Entries in columns 2 to 5 are response means, with standard deviations in parentheses.
2) Entries in columns 6 and 7 are f and p values from ANOVA analyses.
3) Shaded cells refer to total population and attitude scores.
4) N = Survey population size.

Appendix B.2.9: Education Level Differences in *Attitude toward 'Other' Wildlife.*

Attitude Components	Primary (n = 28)	Secondary (n = 129)	TAFE (n = 62)	University (n = 98)	f	p
Cognitive (RR = 1-25)	18.32 (3.31)	19.39 (3.38)	20.69 (2.13)	20.11 (2.90)	5.21	0.002
Affective (RR = 1-25)	15.89 (3.15)	17.34 (3.93)	18.50 (3.51)	16.76 (3.34)	4.44	0.005
Conative (RR = 1-20)	10.96 (3.57)	12.16 (3.52)	13.11 (3.45)	12.95 (2.90)	3.73	0.012
TOTAL Attitude Score (RR =1-70)	**45.18 (7.16)**	**48.88 (8.48)**	**52.31 (6.67)**	**49.82 (6.80)**	**6.28**	**0.0004**

Note: **RR = Response Range,** **NS = Not Significant**

1) Entries in columns 2 to 5 are response means, with standard deviations in parentheses.
2) Entries in columns 6 and 7 are f and p values from one-way ANOVA analyses.
3) Shaded cells refer to total attitude scores.
4) N = Survey population size.

Appendix B.2.10: Income Level Differences in *Attitude toward 'Other' Wildlife.*

Attitude Components	<10 n = 46	10<20 n = 36	20<30 n = 71	30<40 n = 51	40<50 n = 33	>50 n = 55	f	p
Cognitive (RR = 1-25)	19.59 (2.96)	20.17 (2.97)	20.28 (2.86)	19.59 (3.01)	19.67 (2.94)	19.89 (2.89)	0.56	0.729 NS
Affective (RR = 1-25)	17.87 (3.20)	18.22 (3.65)	17.63 (4.16)	16.73 (2.95)	16.73 (3.45)	16.07 (3.58)	2.51	0.031
Conative (RR = 1-20)	12.48 (3.54)	12.36 (3.59)	13.04 (3.38)	12.41 (3.47)	12.61 (3.35)	11.75 (2.88)	0.95	0.451 NS
TOTAL Attitude Score (RR =1-70)	**49.93 (7.70)**	**50.75 (7.75)**	**50.96 (7.79)**	**48.73 (7.34)**	**49.00 (7.77)**	**47.71 (6.95)**	**1.51**	**0.185 NS**

Note: **RR = Response Range,** **NS = Not Significant**

1) Entries in columns 2 to 7 are response means, with standard deviations in parentheses.
2) Entries in columns 8 and 9 are f and p values from ANOVA analyses.
3) Shaded cells refer to total attitude scores.
4) N = Survey population size.

Appendix B.2.11: Resident Community Differences in Environmental Information Base.

Information Components	Rural (N = 35)	Semiurban (N = 143)	Urban (N = 142)	Total Study Population (N = 320)	f	p
Cassowary Information Score (RR = 0-16)	11.57 (2.28)	10.59 (2.44)	6.98 (3.18)	9.09 (3.37)	75.56	0.0001
Wildlife Information Score (RR = 0-11)	7.89 (1.83)	7.54 (2.00)	6.76 (2.23)	7.23 (2.13)	6.88	0.001
TOTAL Information Score (RR =0-27)	**19.46 (3.60)**	**18.13 (3.75)**	**13.74 (4.87)**	**16.33 (4.86)**	**48.20**	**0.0001**

Note: **RR = Response Range,** **NS = Not Significant**

1) Entries in columns 2 to 5 are response means, with standard deviations in parentheses.
2) Entries in columns 6 and 7 are f and p values from ANOVA analyses.
3) Shaded cells refer to total population and information scores.
4) N = Survey population size.

Appendix B.2.12: Education Level Differences in Environmental Information Base.

Information Components	Primary (n = 28)	Secondary (n = 129)	TAFE (n = 62)	University (n = 98)	f	p
Cassowary Information Score (RR = 1-16)	10.21 (3.14)	9.35 (3.28)	9.84 (3.06)	7.94 (3.48)	6.46	0.0003
Wildlife Information Score (RR = 1-11)	6.89 (1.91)	7.40 (2.16)	7.45 (1.96)	6.98 (2.24)	1.17	0.32 NS
TOTAL Information Score (RR =1-27)	**17.11 (4.62)**	**16.74 (4.86)**	**17.29 (4.47)**	**14.92 (4.95)**	**4.25**	**0.006**

Note: **RR = Response Range,** **NS = Not Significant**

1) Entries in columns 2 to 5 are response means, with standard deviations in parentheses.
2) Entries in columns 6 and 7 are f and p values from ANOVA analyses.
3) Shaded cells refer to total information scores.
4) N = Survey population size.

Appendix B.2.13: Income Level Differences in Environmental Information Base.

Information Components	<10 n = 46	10<20 n = 36	20<30 n = 71	30<40 n = 51	40<50 n = 33	>50 n = 55	f	p
Cassowary Information Score (RR = 1-16)	9.13 (3.15)	10.39 (2.98)	9.52 (3.49)	8.80 (2.91)	8.00 (3.72)	8.27 (3.65)	2.65	0.023
Wildlife Information Score (RR = 1-11)	7.70 (2.36)	7.53 (1.98)	7.27 (2.24)	7.04 (2.05)	6.36 (2.06)	7.02 (1.99)	1.84	0.106 NS
TOTAL Information Score (RR =1-27)	**16.83 (5.03)**	**17.92 (4.14)**	**16.79 (5.35)**	**15.84 (4.23)**	**14.36 (5.20)**	**15.29 (4.94)**	**2.61**	**0.025**

Note: **RR = Response Range, NS = Not Significant**

1) Entries in columns 2 to 7 are response means, with standard deviations in parentheses.
2) Entries in columns 8 and 9 are f and p values from ANOVA analyses.
3) Shaded cells refer to total information scores.
4) N = Survey population size.

Appendix B.2.14 : Correlations Involving *Attitudes toward Cassowaries.*

	Attitudes toward cassowaries			
	TOTAL attitude toward cassowaries	cognitive	affective	conative
Attitude toward 'other' wildlife				
cognitive	0.48 ***	0.44 ***	0.38 ***	0.43 ***
affective	0.44 ***	0.29 **	0.42 **	0.36 ***
conative	0.44 ***	0.38 ***	0.30 **	0.59 ***
TOTAL	0.59 ***	0.48 ***	0.48 ***	0.60 ***
***Environmental* Information Base**				
Cassowary Information	0.42 ***	0.27 **	0.45 ***	0.20 *
Wildlife Information	0.28 **	0.17	0.27 **	0.23 *
TOTAL	0.41 ***	0.26 **	0.43 ***	0.24 *

Note: * = Significant at 0.05; ** = Significant at 0.01; *** = Significant at 0.001

APPENDIX B.3.

Analyses: Dominant Social Paradigm (DSP)and New Environmental Paradigm (NEP)

Dominant Social Paradigm (DSP)

New Environmental Paradigm (NEP)

Dominant Social Paradigm and New Environmental Paradigm Combined

Appendix B.3.1: Notes on Psychometric Evaluation.

The DSP and the NEP were subjected to an oblique factor analysis separately and together. This allowed for an analysis of the factor structure of each scale and an assessment of whether the scales measured two separate sets of dimensions.

The objectives of the analyses for each of the scales were as follows:

(a) to examine the construct validity of the scale using exploratory factor analytical procedures.
(b) to perform an item analysis in order to assess the internal consistency of the scale, using item-item and item-total intercorrelation data, and Kaiser's measure of variable sampling adequacy (Abacus Concepts, Statview II, 1987).
(c) to define the factors found in (a).
(d) to determine the relative importance of the factors by identifying the amount of variance associated with each factor.
(e) to compare the results of this analysis on Australian samples with that of Dunlap and Van Liere's (1984).

Appendix B.3.2: Psychometric Evaluation of the DSP.

Prior to this analysis, screening for normality of the data was conducted. Five items exhibiting highly positively skewed distributions were transformed (log transformation). This positive skewness reflected the majority of the population on the disagreement (response rating 1 and 2) side of the Likert scale for these items. Following transformation, all variables had skews below 0.7. Factor analyses were performed on both transformed and untransformed data, but with similar results. Analyses was therefore conducted on the original untransformed data.

Construct Validity. Principal component factor extraction method was used to check the dimensionality of the scale. Dimensionality was considered to be confirmed if the 29 items loaded on separate factors such that relatively distinct components of the DSP scale could be identified. An oblique solution was trialed to check intercorrelation between factors. The results (Appendix B.3.4) identified seven out of nine factors which were correlated, ranging from 0.20 ($N=320$, $p<0.05$) to 0.34 ($N=320$, $p < 0.001$), and justifying the oblique solution. An initial analysis extracted fourteen factors, nine of which had eigenvalues greater than one. Both Cattell's scree test and the Kaiser-Guttman unity rule confirmed the presence of these nine distinct factors, accounting for 61.6 percent of the total variance. Although this confirms the dimensionality of the scale, an additional factor to what had originally been hypothesised was extracted.

Item Analysis: Internal Consistency. Kaiser's measure of variable sampling adequacy supported the use of all test items to construct a total DSP score. This measure quantifies the extent to which a composite of items, and the items within the composite, conform to the desired expectation of partial correlations tending toward zero (Abacus Concepts, 1987). Kaiser's measure was greater than 0.5 for every item and 0.74 for the total matrix, which suggests that the items represent a homogeneous collection of variables. Item-total intercorrelations ranged from 0.21 ($N=320$, $p < 0.05$) to 0.60 ($N = 320$, $p < 0.001$) which also confirmed the internal consistency of the scale.

Definition of Factors in the DSP. An analysis was then performed in which nine factors were specified. This resulted in a clean solution with high simple structure. For the 29 items, the average factor density (factorial complexity) for the oblique solution was moderate, 1.60. Items 2, 8, 12, and 25 were considerably more factorially dense than the other items in the oblique solution, each being defined by more

Appendix B.3.2 (Cont...)

than two factors. Despite the lack of a perfect simple solution, the oblique solution reduces the complexity of items considerably.

From the oblique solution primary pattern loading matrix, it was possible to identify and determine the number of items that loaded on each factor. Ideally, all items designed to measure a particular DSP dimension should have a high loading on the same factor, 0.30 or greater (Tabachnick & Fidell, 1989). However, the choice of cut off for the size of loading to be interpreted was selected at 0.40 or greater. At this loading, items share more than 16% of the variance. (Tabachnick & Fidell, 1989). In line with this, as the loadings increase, the overlapping variance increases, and "the more the (item) is a pure measure of the factor" (Tabachnick & Fidell, 1989, p.640). The results partially supported the factorial nature of the DSP, at least with respect to six of its dimensions, *Science and Technology, Material Abundance, Private Property Rights, Status Quo, Future Prosperity, and Individual Rights* . Of the original eight items of the dimension *laissez-faire government*, five continued to load on this factor, two loaded on the *economic growth* dimension and one loaded on a factor on its own, item 7. If 0.30 was chosen as the cut off loading figure, item 2 of the *laissez-faire government* would load onto this dimension as originally suggested. This would leave item 8 to load with the *economic growth* dimension. Defining the dimensions according to this loading pattern is more understandable as item 2 is addressing the issue of *Government regulation* whereas item 8 addresses *economic growth* issues. Of the eight items for the *laissez-faire government* dimension, Item 7 is the only item for which the respondents demonstrate support for the Government. This could be contributing to this item loading on a factor on its own. This change in the pattern of responses could be due to the way the item is worded. Whatever the cause, item 7 demonstrates the point at which the respondents are not entirely prepared to denigrate the Government.

Importance of Factors. The importance of the factors/dimensions was evaluated by the proportion of variance or covariance associated with the factor after rotation. This factorial determination, the proportion of the common variance that each factor accounts for independent of the other factors (Abascus, 1987), was as follows: fourteen percent of the common variance was attributed to *laissez-faire government* dimension, making it the most important factor. Support for *economic growth* was the second most important factor, accounting for 12.3% of the common variance. The third position was taken by both the faith in *science & technology* and support for *private property rights* dimensions, each accounting for 9.6% of the common variance. In descending order of importance, the results for the remaining dimensions are *status quo* = 8.8%, *future prosperity* = 8.1%; *individual rights* = 7.9%; and *material abundance* = 7.7%.

Comparative Studies. It was difficult to compare this factor analysis with that of Dunlap and Van Liere (1984), because they used an orthologonal varimax rotated solution in contrast to the oblique solution used in this study.

Appendix B.3.3: DSP Factor Intercorrelation Matrix.

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8	Factor 9
Factor 1	1								
Factor 2	.02	1							
Factor 3	**.23***	**.34*****	1						
Factor 4	.05	.05	.08	1					
Factor 5	**.28****	.13	**.28****	.06	1				
Factor 6	.18	**.20***	.16	.02	**.22***	1			
Factor 7	-.08	**.30****	**.27****	.06	.09	.14	1		
Factor 8	**.20***	-.11	-.03	.08	.11	.05	-.08	1	
Factor 9	.09	-.01	.00	-.00	.05	.01	-.07	.03	1

Note: *** = Significant at .05; ** = Significant at .01; *** = Significant at .001**

1) Bold print identifies statistically significant interfactor correlations.
2) Asterisks refer to level of significance.
3) N = survey population size.

Appendix B.3.4: DSP Factor Analysis.

Items Organised into Nine Dimensions resulting from OBLIQUE SOLUTION Factor Analysis.

	Factors								
	1	2	3	4	5	6	7	8	9
EIGENVALUES:	4.59	2.95	2.29	1.92	1.39	1.30	1.26	1.10	1.03
Proportionate Variance:	13.8%	9.6%	12.3%	7.7%	9.6%	8.8%	8.1%	7.9%	5.3%
Contributions									
Factor 1:									
Laissez Faire Government.	1	2	3	4	5	6	7	8	9
1. Regulation of business by Government usually does more harm than good.	.68	-.16	.10	-.07	-.00	-.01	.08	.09	.16
2. There should be more Government regulation of business. **FACTOR 3**	.36	-.17	.51	.18	-.19	-.06	-.18	.08	-.05
3. Government regulation and planning always leads to bureaucracy, inefficiency, and stagnation.	.73	-.19	-.08	-.01	.03	-.02	.04	-.26	.14
4. The Federal Government has too much power over citizens and Local Government.	.77	.08	-.05	-.09	.07	-.03	.02	.04	-.09
5. Government planning inevitably results in the loss of essential liberties and freedoms.	.84	.21	-.22	.02	-.07	.06	-.02	.03	-.01
6. The Federal Government should not interfere with the free enterprise system.	.63	.17	.12	.04	.02	.02	-.01	.11	-.13
7. Just because something is run by the Government it doesn't mean it will be inefficient and wasteful. **FACTOR 9**	.11	.09	.22	-.01	.23	-.02	-.23	.05	.69
8. The profits of big business and industry should be controlled by Government. **FACTOR 3**	.12	-.30	.54	-.01	-.16	-.20	-.01	.20	.29
Factor 2: **Science & Technology**									
16. Most problems can be solved by applying more and better technology.	.06	.53	.11	.03	.03	.14	.15	-.14	.09
17. Scientists can solve any problem we might face if they are given enough time and money.	.00	.68	-.07	-.21	-.02	.13	.11	-.11	.03
18. We cannot keep counting on science and technology to solve human's problems.	.02	.77	-.21	.15	.03	-.19	-.09	.17	.06
19. Through science and technology we can continue to raise our standard of living.	.01	.48	.35	-.03	-.07	-.00	.13	-.22	-.15
Factor 3: **Economic Growth**									
22. Economic growth improves the quality of life of all citizens in Australia.	-.03	.00	.68	-.05	.11	.12	.10	-.14	.12
23. The positive benefits of economic growth far outweigh any negative consequences.	-.14	.06	.67	-.05	.21	.10	.03	-.02	.03
24. Australians would be better off if the nation's economic growth slowed right down.	-.02	-.15	.65	.26	-.16	-.22	.09	-.05	.05
25. There is too much concern with restricting growth and not enough with encouraging it.	.11	.18	.54	-.03	-.09	.03	.03	.19	.31
Factor 4: **Material Abundance**									
26. Australians are going to have to drastically reduce their level of consumption over the next few years.	-.02	.11	.02	.85	.05	-.06	-.01	-.01	.06
27. Australians are going to have to learn to do without many of the things they have taken for granted in the past.	-.07	-.13	.07	.83	-.04	.01	.08	.13	-.07
Factor 5: **Private Property Rights**									
12. Among the fundamental rights in this country is the use of one's property without outside interference.	.13	.15	.18	.05	.59	-.01	-.12	-.06	-.39
13. Property owners have an inherent right to use their land as they see fit.	.11	.13	.18	-.07	.66	.06	-.08	.10	-.23
14. Government restrictions on the use of private property are necessary in order to insure that the land will not be permanently harmed.	.07	-.01	-.09	.09	.63	-.03	.07	.23	.11
15. Property owners have the right to abuse their land even if it becomes unfit for use by future generations.	-.08	-.13	-.21	-.05	.79	-.00	.09	-.13	.25
Factor 6: **Status Quo**									
9. We should know if something new will work before taking a chance on it.	-.00	.11	.02	.00	-.14	.66	-.09	.03	-.11
10. If you start trying to change things very much you usually make them worse.	.04	-.07	-.07	-.07	.01	.77	.04	.09	-.02

11. It is better to stick with what we have than try new things we don't really know about.	-.05	-.10	-.02	.01	.13	.81	-.03	-.09	.16
Factor 7: Future Prosperity									
28. The standard of living for the average Australian will continue to improve for the foreseeable future.	-.04	.04	.01	.01	.04	-.08	.89	.12	.01
29. Australians can expect that their quality of life will be better in the future.	.05	.01	.07	.08	-.02	-.01	.85	.03	-.13
Factor 8: Individual Rights									
20. It is often good to restrict the rights of individuals for the good of society.	-.05	.06	.06	.001	-.05	.03	-.00	.86	-.00
21. In order to solve some of our society's problems it will be necessary to place restrictions on individual's behaviour.	-.03	-.19	-.07	.13	.16	.04	.14	.71	.04

Note: 1) Entries in each cell are factor loading values.
2) Shaded cells identify items loading on the same factor.

Appendix B.3.5: Resident Community Differences in the DSP.

DSP DIMENSIONS	Rural (N = 35)	Semiurban (N = 143)	Urban (N = 142)	**Total Study Population (N = 320)**	f	p
Laissez-Faire Government (RR =1-30, ER = 18-30)	20.46 (6.51)	20.95 (4.88)	18.40 (4.84)	**19.77 (5.19)**	9.34	.001
Status Quo (RR = 1-15, ER = 9-15)	7.6 (2.49)	8.01 (2.85)	7.33 (2.69)	**7.67 (2.76)**	2.15	.119 NS
Private Property Rights (RR = 1-20, ER = 12-20)	11.57 (4.082)	10.43 (3.85)	9.59 (3.38)	**10.19 (3.72)**	4.62	.011
Science & Technology (RR = 1-20, ER = 12-20)	11.63 (3.97)	12.26 (3.24)	11.69 (3.43)	**11.94 (3.41)**	1.15	.317 NS
Individual Rights (RR = 1-10, ER = 6-10)	5.4 (2.43)	4.87 (2.06)	4.88 (2.01)	**4.93 (2.08)**	0.99	.373 NS
Economic Growth (RR = 1-25, ER = 15-25)	17.0 (4.95)	17.38 (4.02)	16.70 (4.01)	**17.04 (4.13)**	0.99	.371 NS
Material Abundance (RR = 1-10, ER = 6-10)	4.51 (2.28)	5.27 (2.22)	5.06 (2.15)	**5.09 (2.19)**	1.68	.188 NS
Future Prosperity (RR = 1-10, ER = 6-10)	5.54 (2.03)	6.39 (1.89)	6.24 (1.97)	**6.23 (1.96)**	2.68	.07 NS
TOTAL DSP (RR =1-145, ER =116-145)	**85.71 (15.26)**	**88.06 (13.52)**	**82.26 (11.76)**	**85.24 (13.23)**	**7.13**	**.0009**

Note: **RR = Response Range, ER = Endorsement Range, NS = Not Significant,**

1) Entries in columns 2 to 5 are response means, with standard deviations in parentheses.
2) Entries in columns 6 and 7 are f and p values from ANOVA analyses.
3) Shaded cells refer to total population and DSP scores
4) N = Survey population size

Appendix B.3.6: Endorsement Levels of the DSP Dimensions.

The following set of results presents standardised dimension means for the assessment of the relative endorsement levels of each DSP dimension. A direct comparison between dimensions in terms of their actual level of endorsement cannot be made without first considering the variation in number of items and its influence on the magnitude of dimension scores. Means of each dimension were standardised on a 5-point scale (correcting for the number of items in the subscale). Standardised mean ranges for the relative endorsement levels are as follows:

Standardised Mean Range	Relative Endorsement Level
Ú1 <2	not endorsed
Ú2 < 3	medium non endorsement
Ú3 < 4	medium endorsement
Ú4 < 5	high endorsement

DSP DIMENSIONS	Standardised Means	Relative Endorsement Level
Laissez-Faire Government	**3.30 SD .87**	**medium endorsement**
Status Quo	2.56 SD 0.91	medium non endorsement
Private Property Rights	2.55 SD 0.93	medium non endorsement
Science & Technology	2.99 SD 0.85	medium non endorsement
Individual Rights	2.47 SD 1.04	medium non endorsement
Economic Growth	**3.41 SD 0.83**	**medium endorsement**
Material Abundance	2.55 SD 1.09	medium non endorsement
Future Prosperity	**3.12 SD 0.98**	**medium endorsement**

Note:

1) Bold face and shaded rows identifies dimensions within the endorsement range.

2) SD = standard deviation.

Appendix B.3.7: DSP Intercorrelation Matrix.

DSP Dimension	TOTAL DSP Score	LG	SQ	PPR	S &T	I R	EG	MA	FP
Laissez-Faire Govt	**0.63** *** r^2= 0.43	1							
Status Quo	**0.41** *** r^2= 0.17	0.13	1						
Private Property Rights	**0.64** *** r^2= 0.40	**0.32** ***	**0.22** *	1					
Science & Technology	**0.49** *** r^2= 0.25	0.05	0.18	0.12	1				
Individual Rights	**0.26** ** r^2= 0.07	0.13	0.06	0.16	- 0.17	1			
Economic Growth	**0.67** *** r^2= 0.44	**0.28** **	0.04	**0.29** **	**0.38** ***	0.04	1		
Material Abundance	**0.29** ** r^2= 0.09	0.02	- 0.05	0.07	0.01	**0.19** *	0.17	1	
Future Prosperity	**0.37** *** r^2= 0.12	- 0.05	0.09	0.14	**0.33** ***	0.01	**0.27** **	0.14	1

Note: * = Significant at 0.05. ** = Significant at 0.01.
*** = Significant at 0.001

1) Main entry in each cell is Pearson's correlation coefficient r.
2) The square of Pearson's correlation coefficient (r^2) is presented in column 2 in addition to Pearson's r.
3) Shaded cells refer to dimension- total score correlations.
4) Bold face identifies statistically significant relationships.
5) Asterisks identifies level of significance.

Appendix B.3.8: Education Level Differences in the DSP.

DSP DIMENSIONS	Primary (n = 28)	Secondary (n = 129)	TAFE (n = 62)	University (n = 98)	f	p
Laissez-Faire Government (RR =1-30,ER =18-30)	28.29 (5.78)	26.92 (5.79)	24.81 (6.29)	24.53 (5.52)	5.48	0.001
Status Quo (RR = 1-15,ER = 9-15)	9.71 (3.03)	7.85 (2.60)	7.39 (2.91)	7.04 (2.52)	7.68	0.0001
Private Property Rights (RR = 1-20,ER=12-20)	12.21 (3.63)	10.91 (3.83)	9.16 (3.43)	9.18 (3.19)	9.18	0.0001
Science & Technology (RR = 1-20,ER=12-20)	13.57 (3.17)	12.44 (3.33)	11.97 (3.34)	10.84 (3.37)	6.80	0.0002
Individual Rights (RR = 1-10, ER = 6-10)	4.04 (1.43)	5.12 (2.22)	4.69 (2.26)	5.08 (1.87)	2.58	0.05
Economic Growth (RR = 1-25,ER=15-25)	14.75 (2.89)	14.04 (3.67)	13.42 (4.10)	12.11 (3.12)	7.14	0.0001
Material Abundance (RR = 1-10, ER= 6-10)	4.93 (2.02)	4.97 (2.21)	4.89 (2.06)	5.42 (2.30)	1.13	0.339 NS
Future Prosperity (RR = 1-10,ER = 6-10)	6.39 (2.23)	6.29 (2.06)	6.76 (1.94)	5.81 (1.66)	3.21	0.0234
TOTAL DSP (RR =1-145, ER =116-145)	**93.32 (11.65)**	**88.46 (13.02)**	**83.06 (13.02)**	**79.93 (11.79)**	**13.24**	**0.0001**

Note: **RR = Response Range, ER = Endorsement Range, NS = Not Significant**

1) Entries in columns 2 to 5 are response means, with standard deviations in parentheses.
2) Entries in columns 6 and 7 are f and p values from ANOVA analyses.
3) Shaded cells refer to total population and DSP scores.
4) N = Survey population size.

Appendix B.3.9: Income Level Differences in the DSP.

DSP DIMENSIONS	Income Levels <10 n = 46	10<20 n = 36	20<30 n = 71	30<40 n = 51	40<50 n = 33	>50 n = 55	f	p
Laissez-Faire Government (RR =1-30, ER = 18-30)	24.61 (5.04)	28.00 (5.53)	26.03 (6.63)	24.60 (6.08)	26.03 (6.18)	26.02 (5.25)	1.86	0.1022 NS
Status Quo (RR = 1-15, ER = 9-15)	8.24 (3.0)	8.36 (2.91)	7.87 (2.63)	6.90 (2.71)	7.82 (2.58)	7.09 (2.63)	2.24	0.05
Private Property Rights (RR = 1-20, ER = 12-20)	10.46 (3.89)	9.81 (4.17)	9.93 (3.61)	9.71 (3.71)	9.85 (3.03)	10.24 (3.61)	0.28	0.924 NS
Science & Technology (RR = 1-20, ER = 12-20)	11.83 (2.94)	11.31 (3.65)	11.83 (3.82)	12.70 (3.15)	12.42 (3.99)	11.25 (3.28)	1.36	0.239 NS
Individual Rights (RR = 1-10, ER = 6-10)	4.37 (1.84)	5.17 (2.37)	5.14 (2.20)	4.98 (2.06)	5.03 (1.86)	4.87 (1.99)	0.95	0.451 NS
Economic Growth (RR = 1-25, ER = 15-25)	13.70 (3.5)	12.53 (4.07)	13.35 (3.72)	13.44 (3.53)	13.42 (3.11)	13.60 (3.45)	0.52	0.758 NS
Material Abundance (RR = 1-10, ER = 6-10)	4.37 (1.98)	4,83 (2.02)	4.66 (2.10)	5.26 (1.99)	5.42 (2.37)	5.85 (2.26)	3.40	0.005
Future Prosperity (RR = 1-10, ER = 6-10)	5.91 (1.87)	6.39 (2.30)	6.0 (2.08)	6.36 (1.63)	6.36 (2.18)	6.25 (1.73)	0.53	0.752 NS
TOTAL DSP (RR =1-145, ER =116-145)	83.61 (13.20)	86.71 (13.09)	84.76 (14.13)	83.88 (12.98)	86.30 (11.49)	84.89 (12.25)	0.29	0.916 NS

Note: **RR = Response Range, ER = Endorsement Range, NS = Not Significant**

1) Entries in columns 2 to 7 are response means, with standard deviations in parentheses.
2) Entries in columns 8 and 9 are f and p values from ANOVA analyses.
3) Shaded cells refer to total DSP scores.
4) N = Survey population size.

Appendix B.3.10: Psychometric Evaluation of the NEP.

Prior to this analysis, screening for normality of the data was conducted. All of the scale items, except for one, exhibited severe negative skewness (range = -0.797 to -2.359), that is, the majority of the population is located on the agreement side (response rating 4 and 5) of the scale. Such a high level of skewness would suggest that this scale is no longer sensitive enough to identify individual differences in the population. Its importance may well be in its reflection of shared community environmental attitudes. To transform the items to an acceptable level of skewness (-0.7 to 0) requires considerable manipulation of the data, with consequent and serious interpretability problems. Because of the difficulty in transformation and interpretation, analysis was conducted on the original untransformed data.

Construct Validity The principal components factor extraction method was used to investigate the dimensionality of the scale. If the dimensions are relatively distinct components of the NEP scale, the 12 items should load on separate factors reflecting these dimensions. Primary factor intercorrelations indicated that all of the factors were correlated, range 0.23 ($N=320$, $p<0.05$) to 0.44 ($N=320$, $p<0.001$) (see Appendix 12.2.2.). Due to this significant correlation, oblique factor solution - the algorithm or orthotran solution, was used. This defines a simple structure solution which allows for factor intercorrelation (Abacus, 1987). An initial analysis extracted six factors, three of which had eigenvalues greater than one. Both Cattell's scree test and the Kaiser-Guttman unity rule confirmed the presence of these three distinct factors, accounting for 49.2 percent of the total variance.

Item Analysis: Internal Consistency The initial approach to internal consistency focused on item-total intercorrelations. The correlations ranged from 0.39 to 0.57, suggesting the 12-item NEP scale had a reasonable amount of internal consistency. This was confirmed by an additional measure, Kaiser's measure of variable sampling adequacy which was in the range of 0.68 to 0.88, with a total of 0.79 for the total matrix. This supported the use of all test items to construct a total NEP score. This measure quantifies the extent to which a composite of items, and the items within the composite, conform to the desired expectation of partial correlations tending toward zero (Abacus Concepts, 1987).

Definition of the factors in the NEP A factor analysis was then performed in which three factors were specified. This resulted in a clean solution with high simple structure. For the 12 items, the average factor density (factorial complexity) for the oblique solution was low, 1.17. This would indicate that a fairly simple structure has been achieved with the majority of items being defined by just one factor. The main exception to this was Items 12 which was considerably more factorially dense than the other items in the oblique solution.

From the oblique solution primary pattern loading matrix, it was possible to identify and determine the number of items that loaded on each factor. The cut off point for the size of loading to be interpreted was selected at 0.40 which allowed for 16% or greater overlap in variance (Tabachnick & Fidell, 1989). The results only partially supported the originally prescribed factorial nature of the NEP (see Appendix 12.2.3.). The one dimension which was very clear in its factor structure, remaining as originally proposed, was the *humanity over nature* dimension, clearly confirming its conceptual validity.

The structure of the original version of the other two dimensions, *balance of nature* and *limits to growth*, differed considerably, requiring a change of labelling. Two *balance of*

Appendix B.3.10 (Cont.....)

nature items (Nos. 2 and 12) loaded with three *limits to growth* items (Nos. 1, 9, and 11) to form Factor 1, and two *balance of nature* items (Nos. 5 and 8) loaded with one *limits to growth* items (No. 7) to form Factor 3. This combination of items from the original two dimensions requires a different interpretation rather than a combination of the two concepts. The main reason for this is the ecology fallacy inherent in the prescientific concepts of the *balance of nature*. The stability and balance of the natural system has been considered an inherently valuable property of the environment that should be protected (Peters, 1991). It has been a driving force behind conservation and resource management from both an ecological perspective and public perspective. Such stability, however, does not exist. Instead, the natural system is highly dynamic. Although one item specifically address the term *balance of nature*, the others could be interpreted as focusing on other concepts such as human interaction with the environment in terms of behaviour, impact. With this in mind, an attempt will be made to label the two factors, 1 and 3.

The items which had the highest loadings on Factor 1, (Nos. 1, 9, and 11) address the issue of the finite nature of earth, the limits of its renewable resources. Of the remaining two items, which have the lowest loading scores, one (No. 2) could be considered to measure the fragility of the earth, its delicacy and vulnerability, while the other (No. 12) focuses on human impact. All of the items in a way deal with negative impact on the natural ecosystem. In combination, the notion of the limited capacity of the earth to cleanse itself, to correct itself, is evident suggesting that damage has been done and there are limitations to the earths' corrective ability, a *limited resilience*. An endorsement of this factor would indicate an awareness of the limitations of the environment in the provision of resources and its limited resilience to abuse. The remaining three items combined to form Factor 3. All of the items address cause and effect issues. Two items (Nos. 5 and 8) illustrated a concern for the consequences of human interference with nature. The third item, item 7 acknowledges the need for developing a steady state economy in order to maintain a healthy economy. Combined these items address the issue of *respect with non-interference*.

Importance of Factors The importance of the factors/dimensions is evaluated by the proportion of variance or covariance associated with the factor after rotation. This factorial determination suggests that 22.8% of the common variance was attributed to the renamed *limited resilience* dimension, making it the most important factor (see Table 4). The belief that *humans do not have dominion over nature* was the second most important factor, accounting for 22.0% of the common variance. The third position was taken by the renamed *respect with non-interference* dimension, accounting for 18.7% of the common variance.

Comparative Studies It was difficult to compare this factor analysis with that of Dunlap and Van Liere (1978); they used an orthologonal varimax rotated solution whereas this study used oblique orthotran rotated solution because all factors were significantly correlated.

Appendix B.3.11: Factor Intercorrelation Matrix (NEP).

	Factor 1	Factor 2	Factor 3
Factor 1	1		
Factor 2	**.34*** **	1	
Factor 3	**.44*** **	**.23***	1

Note: *** = Significant at .05; *** = Significant at .001**

1) Bold print identifies statistically significant interfactor correlations.
2) Asterisks refer to level of significance.
3) N = survey population size.

Appendix B.3.12: NEP Factor Analysis.

Items Organised into Three Dimensions resulting from OBLIQUE SOLUTION - ORTHOTRAN Factor Analysis.

		Factors		
		1	2	3
EIGENVALUES:		3.24	1.65	1.02
Proportionate Variance Contributions:		22.8%	22%	18.7%
Balance of Nature (Dunlap & Van Liere, 1978)				
2.	The balance of nature is very delicate and easily upset.	.45	.11	.14
5.	When humans interfere with the rest of nature it often produces diasterous consequences.	.06	-.06	.68
8.	Humans must live in harmony with nature in order to survive.	.14	-.02	.68
12	Humans are severely abusing the environment.	.41	.02	.33
Limits to Growth (Dunlap & Van Liere, 1978)				
1.	We are approaching the limit of the number of people the earth support.	.88	-.05	-.24
7.	To maintain a healthy economy we will have to develop a steady state economy where industrial growth is controlled.	-.18	.00	.78
9.	The earth is like a space ship with only limited room and resources.	.74	.02	-.01
11.	There are limits to growth beyond which our industralised cannot expand.	.61	-.06	.16
Humanity over Nature (Dunlap & Van Liere, 1978)				
3.	Humans have the right to modify the natural environment to suit their needs.	.05	.65	-.04
4.	Humans were created to rule over the rest of nature.	-.11	.84	.00
6.	Plants and animals exist primarily to be used by humans.	.09	.75	-.12
10.	Humans need not adapt to the natural environment because they can remake it to suit their needs.	-.09	.59	.08

Note:

1) Entries in each cell are factor loading values.
2) Shaded cells identify items loading on the same factor.

Appendix B.3.13: Resident Community Differences in NEP.

NEP DIMENSIONS	Rural (N = 35)	Semiurban (N = 143)	Urban (N = 142)	**Total Study Population (N = 320)**	f	p
Limited Resilience (RR =1-25, ER = 15-25)	20.43 (3.67)	20.92 (3.67)	20.86 (3.32)	**20.82 (3.57)**	0.26	0.770 NS
Respect with non interference (RR = 1-15, ER = 9-15)	13.09 (1.96)	12.63 (2.03)	12.59 (2.13)	**12.66 (2.06)**	0.84	0.434 NS
Humanity not over nature (RR = 1-20, ER = 12-20)	15.4 (2.86)	15.22 (3.61)	15.08 (3.93)	**15.18 (3.67)**	0.12	0.889 NS
TOTAL NEP (RR =1-60, ER =36-60)	**48.9 (7.55)**	**48.76 (6.85)**	**48.5 (6.79)**	**48.66 (6.88)**	**0.078**	**0.925 NS**

Note: **RR = Response Range, ER = Endorsement Range, NS = Not Significant**

1) Entries in columns 2 to 5 are response means, with standard deviations in parentheses.
2) Entries in columns 6 and 7 are f and p values from ANOVA analyses.
3) Shaded cells refer to total survey population and total NEP scores.
4) N = Survey population size.

Appendix B.3.14: Two Australian Comparative Studies of Seven NEP Scale Items.

Item No.	NEP Item	North Queensland (1994) Rural (N=35)	Semi-urban N = 143)	Urban (N = 142)	**Total (N = 320)**	Melbourne (1989) Student Sample (N = 390)	Community Sample (N = 402)	**Total (N = 792)**
2.	The balance of nature is very delicate and easily upset.	4.54	4.56	4.38	**4.48**	4.35	4.27	**4.31**
3.	Humans have the right to modify the natural environment to suit their needs. (recode)	3.69	3.25	3.35	**3.34**	3.21	2.99	**3.10**
4.	Humans were created to rule over the rest of nature. (recode)	3.83	4.08	3.83	**3.94**	3.78	3.81	**3.79**
5.	When humans interfere with the rest of nature it often produces diasterous consequences.	4.29	4.01	4.11	**4.09**	3.94	3.96	**3.95**
6.	Plants and animals exist primarily to be used by humans. (recode)	3.8	3.85	3.94	**3.88**	4.01	3.98	**4.00**
8.	Humans must live in harmony with nature in order to survive.	4.71	4.7	4.54	**4.63**	4.43	4.23	**4.43**
10.	Humans need not adapt to the natural environment because they can remake it to suit their needs. (recode)	4.09	4.06	4.0	**4.04**	3.82	3.84	**3.83**

Note:

1) Entry in each cell is response means.
2) Bold print refers to total sample results.
3) Shaded cells refers to this current study.
4) Reference for Melbourne Study is Blaikie (1992).

Appendix B.3.15: Education Level Differences in the NEP.

NEP DIMENSIONS	Primary (n = 28)	Secondary (n = 129)	TAFE (n = 62)	University (n = 98)	f	p
Limited Resilience (RR =1-25, ER = 15-25)	20.71 (3.56)	20.67 (3.74)	22.21 (3.12)	20.25 (3.43)	4.17	0.007
Respect with non interference (RR = 1-15, ER = 9-15)	12.75 (1.97)	12.91 (2.02)	13.06 (2.25)	12.13 (1.89)	3.77	0.0117
Humanity not over nature (RR = 1-20, ER = 12-20)	13.04 (4.12)	15.31 (3.50)	16.44 (3.33)	14.88 (3.68)	6.16	0.0004
TOTAL NEP (RR =1-60, ER =36-60)	**46.50 (6.55)**	**48.90 (6.82)**	**51.71 (6.41)**	**47.26 (6.70)**	**6.78**	**0.0002**

Note: **RR = Response Range, ER = Endorsement Range, NS = Not Significant**

1) Entries in columns 2 to 5 are response means, with standard deviations in parentheses.
2) Entries in columns 6 and 7 are f and p values from ANOVA analyses.
3) Shaded cells refer to total NEP scores.
4) N = Survey population size.

Appendix B.3.16: Income Level Differences in the NEP.

Income Levels

NEP DIMENSIONS	<10 n = 46	10<20 n = 36	20<30 n = 71	30<40 n = 51	40<50 n = 33	>50 n = 55	f	p
Limited Resilience (RR =1-25, ER = 15-25)	21.30 (3.36)	21.89 (3.58)	21.55 (3.57)	20.47 (3.57)	20.39 (3.27)	20.26 (3.36)	1.889	0.096 NS
Respect with non interference (RR = 1-15, ER = 9-15)	12.89 (2.24)	13.44 (1.78)	12.96 (2.02)	12.59 (2.06)	12.18 (2.31)	12.2 (1.59)	2.48	0.032
Humanity not over nature (RR = 1-20, ER = 12-20)	15.22 (3.95)	16.0 (3.52)	15.68 (3.63)	15.06 (3.69)	14.55 (4.06)	14.82 (3.32)	0.914	0.472 NS
TOTAL NEP (RR =1-60, ER =36-60)	**49.41 (6.71)**	**51.33 (6.52)**	**50.18 (6.24)**	**48.12 (7.28)**	**47.12 (7.06)**	**47.27 (6.06)**	**2.859**	**0.016**

Note: **RR = Response Range, ER = Endorsement Range, NS = Not Significant**

1) Entries in columns 2 to 7 are response means, with standard deviations in parentheses.
2) Entries in columns 8 and 9 are f and p values from ANOVA analyses.
3) Shaded cells refer to total NEP scores.
4) N = Survey population size.

Appendix B.3.17: Notes on Psychometric Evaluation of the NEP & DSP Combined.

Construct Validity As with the psychometric analysis of each of these scales separately, the principal component factor extraction method was used to investigate the overall dimensionality of the combined scales. An oblique solution was trialed to see if factors were correlated. The results indicated that all factors were correlated, range 0.197 ($N=320$, $p<0.05$) to 0.299 ($N=320$, $p<0.01$), which justified the oblique solution. An initial analysis extracted twelve factors which had eigenvalues greater than one. Both Cattell's scree test and Kaiser-Guttman unity rule confirmed the presence of these twelve distinct factors, accounting for 60.3 percent of the total variance.

Item Analysis: Internal Consistency Kaiser's measure was greater than 0.5 for every item and 0.75 for the total matrix, which suggests that the items represent a homogeneous collection of variables.

Definition of Factors in the DSP/NEP Combination An analysis was then performed in which ten factors were specified. This resulted in a clean solution with high simple structure. For the 41 items, the average factor density (factorial complexity) for the oblique solution was moderate, 1.80. DSP Items 2, 7, 8, 19, 24, and NEP items 1, 7, and 9 were considerably more factorially dense than the other items in the oblique solution, each being defined by more than two factors. Despite the lack of a perfect simple solution, the oblique solution does reduce the complexity of the items considerably. From the oblique solution primary pattern loading matrix, it was possible to identify and determine the number of items that loaded on each factor. The results supported the factorial nature of the DSP as defined by the separate factor analysis of this scale. The only addition was to Factor 6 where NEP item 1 loaded with the two *material abundance* items of the DSP. Besides this one NEP item overlap with a DSP dimension, the remaining eleven NEP items loaded separately on two dimensions. Unlike the three factor structure defined by the separate factor analysis of the NEP, two distinct NEP dimensions were defined in this analysis. *Balance of nature* and *limits to growth* were combined into one factor. *Humanity over nature* remained a distinct separate dimension.

Appendix B.3.18: Factor Intercorrelation Matrix.

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8	Factor 9	Factor 10
Factor 1	1									
Factor 2	-.012	1								
Factor 3	**.227 ***	-.171	1							
Factor 4	.125	-.002	.111	1						
Factor 5	**-.23 ***	**.221 ***	-.119	-.07	1					
Factor 6	.078	**-.299 ** ***	.088	-.097	-.109	1				
Factor 7	**.197 ***	.107	.072	.161	-.1	-.022	1			
Factor 8	**.267 ** ***	-.172	**.217 ***	**.252 ***	-.145	.057	.141	1		
Factor 9	**.242***	.058	-.025	.116	-.005	.031	**.211 ***	.14	1	
F actor 10	-.043	**-.257 ** ***	.126	.003	.054	.186	-.123	.059	.045	1

Note: *** = Significant at .05;** = Significant at .01;*** = Significant at .001**

1) Bold print identifies statistically significant interfactor correlations.
2) Asterisks refer to level of significance.
3) N = survey population size.

Appendix B.3.19: Factor Analysis of DSP and NEP Combined.

Items Organised into Ten Dimensions resulting from OBLIQUE SOLUTION Factor Analysis.

	Factors									
	1	2	3	4	5	6	7	8	9	10
EIGENVALUES:	5.5	3.5	2.9	2.3	1.9	1.5	1.4	1.3	1.3	1.1
Proportionate Variance Contributions	11.6%	11.6%	12.0%	7.6%	8.6%	8.3%	6.3%	8.3%	7.4%	7.0%

Factor 1: DSP Economic Growth	1	2	3	4	5	6	7	8	9	10
22. Economic growth improves the quality of life of all citizens in Australia.	.73	-.02	-.02	.06	.00	-.05	.03	.13	.04	-.06
23. The positive benefits of economic growth far outweigh any negative consequences.	.67	-.05	-.10	.03	-.10	-.08	.06	.21	.04	.06
24. Australians would be better off if the nation's economic growth slowed right down.	.62	-.01	.00	-.21	.05	.29	-.12	-.17	.08	-.08
25. There is too much concern with restricting growth and not enough with encouraging it.	.59	.03	.13	.06	-.01	-.01	.17	-.04	-.09	.21
7. Just because something is run by the Government it doesn't mean it will be inefficient and wasteful.	.37	-.20	.19	.18	.13	.01	.04	-.15	-.4	-.10
8. The profits of big business and industry should be controlled by Government.	.36	.13	.11	-.35	-.09	-.04	-.18	-.07	.03	.37

Factor 2: NEP Balance of Nature	1	2	3	4	5	6	7	8	9	10
2. The balance of nature is very delicate and easily upset.	.11	.47	.06	.04	.24	-.09	-.08	.03	.02	-.01
5. When humans interfere with the rest of nature it often produces diasterous consequences.	-.03	.70	-.01	-.03	-.13	.09	.01	-.06	.01	.07
7. To maintain a healthy economy we will have to develop a steady state economy where industrial growth is controlled.	-.36	.63	-.05	-.09	-.12	-.03	.33	.38	-.18	.22
8. Humans must live in harmony with nature in order to survive.	-.00	.73	.02	.07	.04	.08	-.19	.28	.08	-.05
9. The earth is like a space ship with only limited room and resources.	-.00	.36	-.07	.11	.19	-.26	-.03	-.07	.02	-.15
11. There are limits to growth beyond which our industrialised cannot expand.	-.01	.51	.07	.13	.07	-.06	-.18	-.08	-.03	-.17
12. Humans are severely abusing the environment.	-.09	.59	.03	-.02	-.04	-.05	-.07	.27	.06	.03

Factor 3: DSP Laissez Faire Government	1	2	3	4	5	6	7	8	9	10
1. Regulation of business by Government usually does more harm than good.	.10	.01	.69	.05	-.02	-.04	-.24	.00	.03	-.12
2. There should be more Government regulation of business.	.39	.15	.41	-.07	-.06	.18	-.22	-.16	-.09	.11
3. Government regulation and planning always leads to bureaucracy, inefficiency, and stagnation.	-.04	-.12	.71	-.03	.09	-.11	-.12	.00	-.05	-.19
4. The Federal Government has too much power over citizens and Local Government.	-.09	-.00	.73	-.08	-.00	-.08	.13	.14	-.03	.13
5. Government planning inevitably results in the loss of essential liberties and freedoms.	-.20	.02	.84	.10	.00	.03	.14	-.07	-.00	.03
6. The Federal Government should not interfere with the free enterprise system.	.08	.14	.64	.01	.04	.08	.1	.14	.03	.15

Appendix B.3.19 (Cont....)

Factor 4: DSP Status Quo

	1	2	3	4	5	6	7	8	9	10
9. We should know if something new will work before taking a chance on it.	.01	.27	.03	**.65**	.00	.17	.02	-.00	-.04	.04
10. If you start trying to change things very much you usually make them worse.	-.01	-.07	.09	**.68**	-.15	-.18	.03	-.11	.06	.21
11. It is better to stick with what we have than try new things we don't really know about.	.09	-.10	-.02	**.79**	-.01	.00	-.07	.01	-.08	-.04

Factor 5: NEP Humanity over Nature

	1	2	3	4	5	6	7	8	9	10
3. Humans have the right to modify the natural environment to suit their needs.	-.22	.04	.14	.13	**.63**	.04	.06	-.05	-.06	-.08
4. Humans were created to rule over the rest of nature.	-.00	-.03	.03	-.05	**.77**	-.15	.04	.08	.01	.16
6. Plants and animals exist primarily to be used by humans.	.06	.01	.06	-.29	**.71**	-.13	-.01	-.09	.12	.08
10. Humans need not adapt to the natural environment because they can remake it to suit their needs.	.09	.10	-.14	.03	**.58**	.21	-.09	.01	-.17	-.09

Factor 6: DSP 26,27 = Material Abundance and NEP 1.

	1	2	3	4	5	6	7	8	9	10
26. Australians are going to have to drastically reduce their level of consumption over the next few years.	.04	-.03	-.00	.03	.00	**.78**	.09	-.06	.06	-.08
27. Australians are going to have do without many of the things they have taken for granted in the past.	.01	.04	-.07	.04	.03	**.77**	-.08	-.05	.13	.11
1. We are approaching the limit of the number of people the earth can support.	.08	.19	.07	.06	.12	**-.52**	-.02	-.22	.11	-.00

Factor 7: DSP Science & Technology

	1	2	3	4	5	6	7	8	9	10
16. Most problems can be solved by applying more and better technology.	.24	.06	.03	.16	.09	.11	**.49**	.11	.11	-.14
17. Scientists can solve any problem we might face if they are given enough time and money.	.11	-.08	-.09	.08	.03	-.23	**.71**	.04	.07	-.05
18. We cannot keep counting on science and technology to solve human's problems.	-.05	-.19	.01	-.05	-.04	.12	**.66**	-.16	-.04	.05
19. Through science and technology we can continue to raise our standard of living.	.38	.04	0.04	-.08	-.08	.02	**.43**	.03	.09	-.17

Factor 8: DSP Private Property Rights

	1	2	3	4	5	6	7	8	9	10
12. Among the fundamental rights in this country is the use of one's property without outside interference.	.10	.04	.13	-.09	.01	.08	.05	**.71**	.01	-.00
13. Property owners have an inherent right to use their land as they see fit.	.10	-.03	.15	.04	-.11	-.02	.01	**.67**	.01	.12
14. Government restrictions on the use of private property are necessary in order to insure that the land will not be permanently harmed.	-.02	-.45	.16	.14	-.03	-.00	-.14	**.27**	.14	.01
15. Property owners have the right to abuse their land even if it becomes unfit for use by future generations.	-.11	-.39	-.05	.09	.05	-.15	-.15	**.55**	.01	-.23

Factor 9: DSP Future Prosperity

	1	2	3	4	5	6	7	8	9	10
28. The standard of living for the average Australian will continue to improve for the foreseeable future	.05	-.06	-.06	-.01	-.06	.01	.05	-.05	**.86**	.01
29. Australians can expect that their quality of life will be better in the future	.08	.00	.00	.01	.02	.12	.04	.01	**.83**	-.04

Factor 10: DSP Individual Rights

	1	2	3	4	5	6	7	8	9	10
20. It is often good to restrict the rights of individuals for the good of society	.05	-.04	-.00	.09	.06	.03	.04	-.06	-.04	**.79**
21. In order to solve some of our society's problems it will be necessary to place restrictions on individual's behaviour.	-.06	-.19	-.00	.12	.08	.07	-.16	.07	.07	**.62**

Appendix B.3.20: Notes on the Second Order Factor Analysis of DSP and NEP Combined.

Because the oblique factor analysis of both the DSP and NEP scales together indicated that several of the factors were intercorrelated, a second order factor analysis was attempted.

Construct Validity The principal component factor extraction method was used to extract the second order factors from the combined scales. An oblique solution was trialed to see if factors were correlated. As can be seen by the r's in Appendix B.3.21 all factors were correlated, range -0.22 ($N=320$, $p<0.05$) to 0.43 ($N=320$, $p<0.001$), which justified the oblique solution. An initial analysis extracted four factors which had eigenvalues greater than one. Both Cattell's scree test and Kaiser-Guttman unity rule confirmed the presence of these four distinct factors, accounting for 58.0 percent of the total variance.

Internal Consistency Kaiser's measure was greater than 0.5 for each factor and 0.63 for the total matrix.

Definition of Second Order Factors **Factor 1** has subsumed the DSP dimensions, support for *economic growth*, faith in the efficacy of *science and technology*, and faith in *future prosperity*. The application of scientific knowledge to improving the condition of humans is readily accepted as a fundamental objective of contemporary Western society. A characteristic of this mode of thinking is optimism, optimism over human endeavours especially presented as a faith in the technology of intervention and manipulation (O'Riordan, 1976). Closely linked to this is the concept of growth, economic growth, "The degree of faith in science and technology is seen to expose different ideologies about the merits and purposes of growth. Technological optimists regard growth and technological improvement as interdependent, while those who doubt the efficacy of modern technology believe that a complete change in its form and function is possible outside sustained economic growth" (O'Riordan, 1976, p.). The whole concept of growth is endemic in most societies. *Economic growth* is closely linked to collective wealth which is generally regarded as essential for improved social and personal well-being. This is equated with an increased standard of living and hence quality of life. A *prosperous future* includes high quality of life/standard of living.

Factor 2 subsumes the DSP dimensions faith in material abundance and individual rights, with the strong negative with the balance of nature/limits to growth.

Appendix B.3.21 : Factor Intercorrelation Matrix.

	Factor 1	Factor 2	Factor 3	Factor 4
Factor 1	1			
Factor 2	0.16	1		
Factor 3	**-0.29****	**-0.22***	1	
Factor 4	**0.43** ***	**0.33** ***	**-0.37** ***	1

Note: * = Significant at .05; ** = Significant at .01;

*** = Significant at .001

Appendix B.3.22: Second Order Factor Analysis of the DSP and NEP Combined.

Dimensions Organised into four factors resulting from OBLIQUE SOLUTION Factor Analysis.

	Factors			
	1	2	3	4
EIGENVALUES:	2	1.62	1.08	1.05
Proportionate Variance Contributions	19%	20%	16%	21%

FACTOR 1	1	2	3	4
DSP - Economic Growth	.48	-.00	-.34	.11
DSP - Science & Technology	.59	-.27	-.17	.02
DSP - Future Prosperity	.93	.1	.32	-.17

FACTOR 2				
NEP - Balance Of Nature/Limits to Growth	.31	-.68	.14	-.17
DSP - Material Abundance	.17	.78	-.13	-.38
DSP - Individual Rights	-.04	.66	.61	.24

FACTOR 3				
NEP - Humanity Not Over Nature	.08	-.11	.80	.02
DSP - Individual Rights	-.04	.66	.61	.24

FACTOR 4				
DSP - Laissez-Faire Government	-.23	.13	-.12	.62
DSP - Status Quo	.02	-.35	.22	.83
DSP - Private Property Rights	.1	.02	.00	.66

APPENDIX B.4.
Analyses: *Environmental* Concern

Appendix B.4.1: A Review of Previous Research on *Environmental* Concern.

How have the social scientists researched *environmental* concern? What follows is a selective rather than exhaustive review of social science studies on *environmental* concern. The focus of the review is on how previous studies have operationalised and conceptualised concern and the attempts that have been made at theoretical development. A deliberate decision was made to not review the results of these studies because, as will be shown, the variety of indicators used is vast making replication of early studies with comparable measures of *environmental* concern very difficult. Nevertheless, where results are available for a comparable *environmental* concern indicator used in this research, they will be discussed in the appropriate results section.

Selected Social Science Studies

Tognacci et al's (1972) study of the social determinants and psychological components of *'environmental'* concern was one of the first to use such a comprehensive selection of variables as an operational measure of *'environmental'* concern. Although they did not use the following terms, an overview of the scales used reveals measurements of *value worth, efficacy of (others) efforts, perceived threats/risks to self and environment, willingness-to-act, willingness-to-support regulations, and personal attitudes*, various combinations of which formed composite scores for each concern sub-scale. Unfortunately it was not possible to assess the significance of each of these measurements since only their composite results were given. All of the scales were considered to be conceptually unique in content. No attempt was made to combine them into a composite measure of *'environmental'* concern. Rather all were retained as distinct entities. No theoretical rationale was provided for the selection strategy. Besides such a comprehensive selection of *'environmental'* concern variables, the other noteworthy feature of the study was the careful consideration given to both general and specific measures of *'environmental'* concern.

Buttel and Johnson (1977) used five items to measure an hypothesised two dimensional *'environmental'* concern. The first dimension addressed issues of environmental reform such as *willingness-to-support* actions against polluters regardless of costs. The second dimension contained items selected by the authors for their "environmental concern" content, including measures of *willingness-to-support* efforts to control pollution, and create more parks, and a *direct concern measure* - awareness of urgency of environmental problems. The theoretical rationale provided for choosing these two dimensions of *'environmental'* concern, referred to as the redirective and ameliorative, was that they reflected the "ideological centre and periphery of the environmental movement." (p.50). According to this perspective, the main purpose of this *'environmental'* concern measure was to differentiate between the two types of environmentalists, those who had ameliorative environmental agendas and those who were more radical and choose to challenge the system. The authors' basis for exploring two such diverse styles of environmental partisanship was in Schnaiberg's reference to "....environmentalists are not cut from the same cloth and tend to advance diverse policy proposals for enhancing environmental quality" (p.50). If in fact these two styles exist in the environmentalists, the authors proposed that this would limit assessment of the correlates. They raised the problems of measurement and conceptualisation of *environmental* concern and they demonstrated that it was at least bi-dimensionality

The development of an *environmental* concern scale by Weigel and Weigel (1978) was driven by what they considered was a need to create a research tool that was capable of examining the correlates and determinants of attitudinal concern about environmental

Appendix B.4.1. (Cont.....)

quality, longitudinal changes in public attitudes, and the attitudinal impact of environ oriented policies, legislation, and educational efforts. In this way the efficacy of behaviour change procedures could be evaluated. Their operationalisation of *'environmental'* concern was without theoretical foundation. It consisted of a number of verbal commitment items such as *willingness-to-pay* and *willingness-to-support* regulations, *perceived threats/risk* of environmental hazards to self and others, and *general beliefs/attitudes.*

The sociologists Van Liere and Dunlap have addressed *'environmental'* concern in a number of studies (e.g. 1978, 1980, 1981). Their view of *'environmental'* concern was 'public concern for environmental quality'. In their 1980 meta-analysis of the social bases of environmental concern they examined the correlates of environmental concern without any critical discussion of how it had been operationalised in the studies reviewed. Their 1981 article explored the problems of measurement of *'environmental'* concern. The attention in this article was directed toward constructing a standardised *attitude* scale which could surmount problems of widely different measures, shifting meanings, and lack of comparability. Scales were developed which varied with respect to substantive issue and different theoretical conceptualisation. The measures included the following scales: population scale, pollution scale, natural resource scale, environmental regulation scale, environmental spending scale, and environmental behaviour scale. The results of this study did lead the authors to conclude that it does make a difference how *'environmental'* concern (public concern for environmental quality) is measured.

The importance of careful specification of measures in studies of *'environmental'* concern was also a prime consideration in Samdahl and Robertson's (1989) study. In light of the discussions of measurement specifications highlighted in previous research, they accepted the notion that *'environmental'* concern was 'not unidimensional and should not be measured or interpreted in a global fashion" (p.63). In doing so they operationatised *'environmental'* concern using the following three distinct measures: perceptions of environmental problems in the local community, support for environmental regulation, and ecological behaviour. The basis for the selection of these three measures was that they 'frequently appeared in previous studies' (p.64). The results of the analyses confirmed the importance of careful specification and measurement.

Schahn and Holzer (1990) were also very conscious of the calls for differentiation between the various components of *'environmental'* concern. In developing a new measurement instrument for operationalising *'environmental'* concern, they emphasised these distinctions between the various components. They also distinguished between concepts and topics. Four concepts were chosen: affect, verbal commitment, self-reported actual commitment, and knowledge which had been established by Maloney and Ward (1973). For each of these conceptual scales, seven topical items were chosen. Their reason for measuring specific topical areas was the heterogeneity of environmentally relevant behaviour. As they put it, "differential correlations with background variables can not be found if only global scales are used" (p.770).

Baldassare and Katz's (1992) study examined what they refer to as another critical dimension of environmental concern, "the extent to which individuals perceive their own health and personal well-being are directly threatened by environmental problems, such as air and water problems" (p.603). They regard this 'perception of environmental problems as a threat to personal well being' as a significant factor in environmentally responsible behaviour. Their results confirmed this. In fact, this dimension of *'environmental'* concern was found to better explain environmental practices than demographic and political factors.

Appendix B.4.1. (Cont.....)

Gigliotti's (1992) study only used the term *'environmental'* concern in the discussion section. However, although the terms used throughout the paper were environmental attitude and materialism, they were synonymous with *'environmental'* concern. Implications for environmental education was the driving force behind this study. *'Environmental'* concern was operationalised as a level of materialism which was measured by *willingness-to-give-up* (pay) items. The theoretical rationale for this measurement was that human needs and desires for material goods (materialism) and individual's willingness to make personal sacrifices to help solve environmental problems was one of three fundamental factors that drive the human activities that interact with Earth's natural system. From this it followed that solving contemporary environmental problems would require changes in personal lifestyles, that is it would involve tradeoffs. The author therefore attempted to understand the processes involved in the human-environment relationship by addressing the *'environmental'* concern - behaviour link. By measuring *'environmental'* concern in this way, Gigliotti provided the connection between lifestyle and behaviour. He identified a barrier between the environmentally concerned, as measured by the importance of environmental issues, and environmentally responsible behaviour.

Unlike most of the studies reviewed, Axelrod and Lehman's (1993) study provided detailed theoretical explanations and empirical evidence for the conceptualisation and operationalisation of the factors selected to predict what the authors refer to as environmentally-concerned behaviour. The driving force for the research was the attempt to better understand the factors that guide individual choice regarding environmentally responsible behaviour. Although this study did not indicate that it was examining *'environmental'* concern it did identify as its aim the investigation of the psychological antecedents of individual's reactions to *'environmental'* concern*s*. The factors they choose in the investigation did measure *'environmental'* concern issues. For example, the three attitudinal factors all addressed concepts central to *'environmental'* concern, *threat perception* - perceived likelihood, severity and immediacy of environmental problems, *issue importance* - absolute and relative importance of the environment to the individual, *general attitude* - evaluation regarding need for environmental protection. The efficacy factors also addressed concern items such as *evaluation of the effectiveness* of environmental actions and *personal control* -ability of the self to carry out environmentally responsibility actions. The third factor, the *outcome desires*, was actually a cost/benefit analysis and was centred on the rewards and/or punishments the individual associated with engaging in a particular behaviour. The second and third factors could be interpreted as measures of potential barriers to the realisation of the *'environmental'* concern, demonstrated in the first factor, in action.

Dunlap, Gallup and Gallup's "Health of the Planet Survey" (1993) is one of the most comprehensive recent studies of *'environmental'* concern. The survey, one of the largest environmental surveys conducted, used a wide range of measures including *perception of seriousness* of environmental problems, support for environmental protection (*willingness-to-support*), *importance or salience* of environmental problems, *level of concern, perceived quality* of local, national and global environments, and perception of risk to personal health of environmental problems. It is interesting to note that the context of the items and survey was national rather than local or global.

Scott and Willits's (1994) study does not present a clear conceptual or operational definition of *'environmental'* concern. In fact the term was used synonymously with environmental attitudes and environmental opinions. In addition the authors were inconsistent in their actual operationalisation of *'environmental'* concern. The indicators that they chose, seek, in their words, "to assess concern across a variety of attitude items and environmentally-related behaviour." (p.250). The attitude component of environmental concern was assessed using the NEP scale which provided a measure of

Appendix B.4.1. (Cont.....)

what they described as *general* orientations. Apart from this general statement, no theoretical rationale was given for selecting this scale as a measure of the attitudinal indicator of *'environmental'* concern. Both consumer and political behaviour items together formed a composite score of self-reported behaviours, forming the behavioural component of *'environmental'* concern. Although these were viewed initially as two indicators of *'environmental'* concern, the attitudinal component was often referred to as the measure of concern, for example, "..Pennsylvanians expressed a high degree of concern toward the environment but engaged in few ecologically oriented behaviours." (p.254), and ".....although people express a relatively high level of concern about the environment, they engage in few environmentally oriented behaviours." (p.240). This attitude-behaviour inconsistency in fact provided the motive for the study. Despite assessing independently these two indicators of *'environmental'* concern and the relationship between them, the authors do not develop this any further, such as, is real environmental concern the combination between expressions of support for environmental principles together with engaging in activities that protect the environment?

The two important issues raised in Wall's (1995) study were: general versus specific measurement of environmental concern, and trade-offs. The need to address local and specific environmental issues was considered to be important for improving the quality of research addressing environmental concern and was grounded in the theoretical recommendations of attitude-behaviour research. The notion of trade-offs was seen to play a central role in defining the level of environmental concern, "The incorporation of a notion of trade-offs into measures of environmental concern by forcing people to choose between environmental quality and other desired goals, such as employment and job security, was seen to provide for a more realistic understanding of the determinants of environmental attitudes." (p.299). The shortcoming of the study is that just three items were used to measure general, specific, and trade-off issues associated with environmental concern.

Outcome of Research

The studies reviewed reveals many problems with measurement and meaning. Few attempts have been made to achieve construct or criterion validity; rarely is face validity addressed. Very different research agendas has driven the research, for example, identifying ideological groups or constituencies versus a theoretical exploration of belief-behaviour links. Only a few attempts have been made to distinguish concern from *concerns*, concern about what *might* happen from concern about what *has* happened, local from global concerns, etc. In addition, despite the improvements in theoretical and substantive grounding of concepts and measurements that have been made, problems remain for *environmental* concern. Defining the meaning *environmental* concern possesses for individuals is difficult, as is the cross-comparison of results and establishing the empirical generalisations about relationships between *environmental* concern and other variables. It has been noted critically that lack of concise definitions is a consequence of the heterogeneity of approaches underlying most of the studies conducted. The most evident lacks of coherence are found in the theoretical conceptualisation of concern and the methods used for examining concern.

Theoretical Models

Stern and colleagues are arguably the theorists who have most consistently and comprehensively addressed the issue of *environmental* concern over the past five years (Stern 1992a, 1992b; Stern, Dietz & Guagnano, 1995; Stern, Dietz & Kalof, 1993). The importance of Stern's (1992a) 'big picture' human-environment transaction model is that

Appendix B.4.1. (Cont.....)

it does address environmental-related behaviour specifically and attempts to frame and situate environmental concern issues within this theoretical model. In addition, the principal aim is to be able to communicate with planners and government (Reser et al., 1996). Although this model has been outlined previously (Chapter 3), its importance in the context of *environmental* concern suggests that a brief revisiting of certain aspects of the model is warranted. Stern sees the role of social and behavioural science as improving our understanding of the function of individual and interpersonal behaviour in the human-environment relationships, such as the human causes of global environmental change, (a subset of activities that alter environmental conditions), and the human consequences of and responses to global environmental change. In this multi-stage causal model of environmentally relevant

behaviour, behaviour and its direct effects can feed back into the system. The human behaviours that are the most important proximate causes of destruction have to first be identified. Stern argues that it is when humans see the negative impact of their behaviour that they are motivated to behave in a particular way. What is particularly important, and what presents a critical intervention opportunity, is when environmental damage registers on individuals so that they understand that their own behaviour is having this negative impact on the environment - an understanding that carries implications of 'responsibility for' and 'responsibility to do' something. Although *environmental* concern is not directly addressed or defined in this model it is implicit in that Stern's approach is specifically focused on how individuals and human systems *respond* to external stresses and *negative feedback* . Stern (1992a, pp. 279-280) acknowledges the problems with the use, measurement, and understanding of *'environmental'* concern,

> The anarchy of measurement reflects theoretical ambiguity about the nature of environmental concern. At least four concepts can be found - often conflated - in the literature and the measuring instruments. In one concept, environmental concern reflects a new way of thinking - an ecological awareness or New Environmental Paradigm(NEP) ... - a concern for maintaining the balance of nature as an end in itself or as a spiritual value. The NEP scale developed by Dunlap & Van Liere (1978) measures this concept of environmental concern with such items as "the balance of nature is very delicate and easily upset'. In a second concept, environmental concern is tied to anthropocentric altruism: people care about environmental quality not mainly for its own sake, but because they believe its loss threatens to harm the health or well-being of large numbers of people. ... In this research, general concern about environmental problems is measured by statements of belief that these problems are serious or important; general concern is held to predict action only among people who believe the environmental problems has adverse consequences for humans. ... In a third concept, environmental concern is a function of egoism: people care about environmental quality only to the extent they believe it might affect their own well-being or that of close kin. ...In a fourth concept, environmental concern is a function of some deeper cause, such as Rokeach's 'terminal values', underlying religious beliefs, or a shift from materialist to postmaterialist cultural values."

The typology of existing concepts of *environmental* concern that Stern outlines is similar to the functional attitude approach - the motivational bases of attitudes (Herek, 1986; Shavitt, 1989; Snyder & DeBono, 1989). But as Reser and colleagues (1996) point out, "Unfortunately Stern never really addresses or fully explains the functions being served, the underlying processes and dynamics involved, or the behaviour change implications of alternate provision for particular needs - rather, items are simply selected that, on the face of it, tap a particular function (or type of concern)" (p.30). In addition, there are problems with the synonymous use of environmental attitude for environmental concern, the omissions of the nature of appraisal and coping processes, the lack of addressing

Appendix B.4.1. (Cont.....)

psychological processes and variables, and the emphasis on global concern instead of local concerns, to mention a few.

In a more recent attempt by Stern and colleagues (1995) to address *environmental* concern in the context of social psychology and effective intervention, they developed what they refer to as an "explicit theoretical model of environmental concern" (see Figure B.4.1.1). Although they do not clearly indicate whether *'environmental'* concern encompasses everything, it is assumed to be the more encompassing psychological state derived from values, beliefs and attitudes. In this causal model, Stern places an emphasis on general measures, considering them to more useful measures of global concern. In this way he tends to "privilege *shared* social understandings (social representations) over personal representations of concern, and *global* issues and problems over *local concerns* (Reser et al., 1996, p.33). By using instruments such as the New Environmental Paradigm as a measure of general beliefs and global concern, global is equated with general which ignores the fact that global problems can be assessed in a very personalised, individual way.

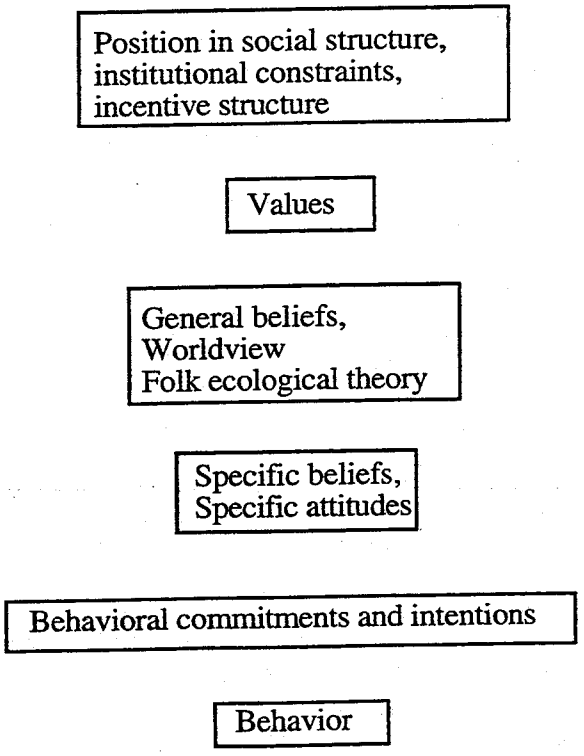

Figure B.4.1.1 A Schematic Causal Model of Environmental Concern
(Source: Stern et al., 1995)

Despite the problems outlined, Stern's approach to *environmental* concern in both models (Stern 1992a, 1992b; Stern, Dietz & Guagnano, 1995; Stern, Dietz & Kalof, 1993), attempts to link human behaviour and psychology to global environmental change and consciously and critically addresses the nature and measurement of *environmental* concern. In addition, it has been an attempt at formulating where and how human behaviour links into the critical process of human impact and ecosystem cost - the environmental crisis.

Appendix B.4.2: The Specific Issue - The Cassowary.

The primary focus in the clarification of this first *environmental* concern scale was the local or specific issue - the endangered species, the cassowary. Two sub-scales were formed containing items which were relevant to this species. The first sub-scale was defined as *concern for the well being of cassowaries* that is, concern for the cassowary for its 'own sake' (Thompson & Barton, 1993) As outlined in the *environmental* concern taxonomy this is identified as *ecocentric* concern (see Table 14.3.). The second sub-scale addresses cassowary-specific issues that are of concern to the human population that is, concern about the impact on self and/or others; identified as *egoistic/anthropocentric* concern (see Table 14.3.).

'Concern for the well being of cassowaries' Concern for a species of the natural environment, as discussed previously, is considered an important and prerequisite precursor to environmentally responsible behaviour aimed at conserving that species. It incorporates an appraisal of the environmental threat (the survival of cassowaries) including the recognition that the **threat is real**, that humans are in some way **responsible** for the situation, and a judgement that action such as **protection** is necessary. In addition this concern incorporates some component of **value worth** of the species (Reser et al., 1996). These categories of concern incorporate both cognitive and emotive appraisal of the situation. Three of these categories are made up of items measured on the 5-point Likert scale. Open-ended items are also included providing additional information on these concern categories. They in particular tap into individual feelings - experiential and emotive appraisals. All measures were intended to provide complementary perspectives on the nature and degree of *concern for the well being of cassowaries* (see Appendix B.4.3)

(1) Perception of **risk** of species loss - **is the threat real?**
Four items measure *awareness that the survival of the cassowary is at risk.* The construction of this variable has been based on the assumption that an awareness that something is wrong, that the system is in trouble is an important component of concern for the well being of the natural environment (Reser et al., 1996). Four 5-point Likert items evaluate the extent to which respondents consider the survival of cassowaries to be at risk. Item-item intercorrelation ranged from 0.40 ($N = 320$, $p < 0.001$) to 0.62 ($N = 320$, $p < 0.001$). Kaiser's measure of variable sampling adequacy for total matrix of items was 0.77 providing an adequate level of internal consistency.

(2) Perception of **threats** that causes species loss - **attribution of responsibility**.
Awareness of major cause of the decline of cassowaries , or *consequences of habitat loss* in terms of this species was the second concern variable to be measured. Recognising that human behaviour, particularly in the context of modification of habitat, is primarily responsible for threatening the survival of this species, is critical. This attribution of personal and/or collective responsibility is an important feedback from the environment (Eden, 1993; Stern 1992a, b), because it establishes liability for resolving environmental problems (Hallman & Wandersman, 1992). Three 5-point Likert items identify the extent to which respondents evaluate the absolute importance of the major cause of the decline of the species - human impact through habitat loss. Item-item intercorrelation ranged from 0.50 ($N = 320$, $p < 0.001$) to 0.52 ($N = 320$, $p < 0.001$). All items were significantly intercorrelated. From the exploratory factor analysis (see Appendix B.4.3.) Kaiser's measure of variable sampling adequacy for total matrix of items was 0.69. Relative importance of habitat modification compared to four other anthropogenic threats to the species was also examined.

Appendix A.4.2. (Cont.....)

(3) Need for Action - **protection is necessary.**

The judgement that *the species should be protected* was another important assessment of the extent to which a system is considered to be under threat and the extent to which the public is prepared to adopt and accept actions and behaviours that would go toward saving this species. One open-ended item identifies whether respondents consider the protection of cassowaries to be necessary. Those who volunteered that cassowaries should be protected was given a score of five, those without a protection comment scored a zero.

(4) **Value worth**

The *value worth* items have been difficult to separate out clearly into those which are ecocentric and those which are egocentric. In some instances overlap will occur. However ecological relevance, right to live, and indicators of ecosystem health were assumed to be value worth issues specifically relevant to ecocentric concern, a concern for cassowaries for its 'own sake' as opposed to concern for the well being of self and others.

instrumental 'value'/ecological relevance of cassowaries - one open-ended item identifies and measure importance of cassowaries to the environment in terms of their ecological function. One 5-point item identifies the extent to which respondents evaluate the value of cassowaries. These two items correlated at r (N=320) = 0.27, $p < 0.01$.

intrinsic 'value' of cassowaries - one open-ended item identifies respondents belief that the cassowary is unique and has the right to live.

indicator 'value' of ecosystem health - one 5-point Likert item measures the extent to which respondents consider cassowaries to be an indicator species of ecosystem health and well being.

aesthetic 'value' of cassowaries - one open-ended question measures the aesthetic value of cassowaries according to descriptions of its physical appearance such as beautiful, attractive, magnificent, majestic. One 5-point item measures attractiveness of cassowaries. These two items correlated at r (N=320) = 0.31, $p < 0.01$. Aesthetic experience with nature is known to evoke strong emotions in people (Kellert, 1996), particularly the aesthetic perspective that stresses the "charismatic megavertebrate" - such as the cassowary.

In addition, an exploratory factor analysis confirmed the presence of these sub-categories (see Appendix B.4.3).

'Concern about the economic, lifestyle, and psychological well being of self and others'

As discussed previously, being concerned for the well being of cassowaries is not in itself sufficient for engaging in desired behaviour. Although it is considered an important precursor to environmentally responsible behaviour, the strategy adopted for coping with this type of concern is usually determined by factors such as those represented by egoistic/anthropocentric concern, that is *'concern about the physical, economic, lifestyle, and psychological well being of self and others'* . These concerns can act as both 'barriers' to and 'motivators' of the translation of *'concern for the well being of cassowaries'* to behaviour. Rather than being complimentary perspectives, the two dimensions of this category of concern are anticipated to be in considerable tension. Conflict deriving from this tension between, on the one hand the economic and lifestyle costs associated with conservation strategies, and on the other hand, the positive feedback in terms of psychological well being that cassowaries offer, in itself can produce anxiety and stress (see Appendix B.4.5. for scale items).

Appendix A.4.2. (Cont.....)

(1) Concern about the **economic and lifestyle well being**
Awareness of the consequences of implementing environmental protection of cassowaries- restrictions and regulations - two 5-point Likert items measure respondents evaluation of the cost of restrictions/regulations/protection of the species to themselves. These two items are correlated at r (N=320) = 0.40, $p < 0.001$.

(2) Concern about **psychological well being**
awareness of the importance of the cassowary to psychological well being - seven 5-point items measure the benefits of the species to the self in terms of psychological well being, that is, how does the cassowary make you feel?, is it symbolic of the beauty of nature? Kaiser's measure of variability sampling was 0.85 for this scale.

Appendix B.4.3: Operationalisation Of *Concern For The Well Being Of Cassowaries.* *(Local Ecocentric Concern)*

Component	Question	Score	Source
1. Perception of Risk of species loss	**Is the threat real ?**	**Total 20**	
Awareness that the survival of cassowaries is at risk.	The survival of cassowaries in the wild is severely threatened	5	Section 4F.Qs.27
	How would you rate the extent to which the cassowary is at risk in terms of their survival.	5	Section 4B.Qs.8
	In some areas of North Queensland localised extinctions has already occurred.	5	Section 4F.Qs.29
	If habitat continues to be cleared, cassowaries will become extinct.	5	Section 4F.Qs.30
2. Perception of threats that cause species loss	**Attribution of responsibility** awareness that major cause of the decline of cassowaries is habitat loss - human impact	**Total 15**	
a).Awareness of what actually **causes** the threat to the species survival.	Habitat loss is the major threat to the survival of cassowaries	5	Section 4F.Qs.28
b) Awareness of **severity, immediacy, importance** of these threats.	Indicate on a scale of 1 to 5 how important a threat you believe : 1. habitat clearing is to cassowaries. 2. habitat fragmentation is to cassowaries.	 5 5	Section 4D.Qs.14
3. Need for Action	**Should this species be protected?**	**Total 5**	
	In your own words, how would you describe your personal feelings about cassowaries? (should be protected ?)	5	Section 4C. Qs.9. **Open-ended**
4. Value Worth	**Attribution of value**	**Total 35**	
a) Instrumental Value - ecological relevance of cassowaries	What role do you think cassowaries play in the ecosystem? (Ecological Function)	5	Section 4C. Qs. 13 **Open-ended**
	Please specify the nature and intensity of your feelings for cassowaries by using the items and scales below: worthless.....valuable	5	Section 4C. Qs.10.
b)Intrinsic value of cassowaries	In your own words, how would you describe your personal feelings about cassowaries? (unique; right to live)	10	Section 4C. Qs.9. **Open-ended**
c) Indicator value of cassowaries	A healthy cassowary population represents a healthy environment.	5	Section 2 Qs.4
d) Aesthetic Value	In your own words, how would you describe your personal feelings about cassowaries? (Aesthetic Factors - physical appearance)	5	Section 4C. Qs.9. **Open-ended**
	How attractive do you consider cassowaries to be?	5	Section 4B.Qs.8

Note:

1) All items in clear cells were scored on a 5-point Likert scale.
2) Items in shaded cells were open-ended and excluded from factor analysis.
3) Open-ended items were dummy-coded: for example, an instrumental value was coded 5, absence of an instrumental value was coded 0.

Appendix B.4.4: Exploratory Factor Analysis of *Concern for the well being of cassowaries.*

Items Organised into Three Dimensions resulting from OBLIQUE SOLUTION - ORTHOTRAN Factor Analysis.

		Factors		
		1	2	3
EIGENVALUES:		4.27	1.27	1.00
Proportionate Variance Contributions:		24.0%	14.0%	19.0%
	Perception of risk to survival of cassowaries			
1.	The survival of cassowaries in the wild is severely threatened.	0.79	0.14	0.04
2.	How would you rate the extent to which the cassowary is at risk in terms of their survival.	0.83	0.17	-0.16
3.	In some areas of North Queensland localised extinctions have already occurred.	0.82	0.06	-0.00
4.	If habitat continues to be cleared, cassowaries will become extinct.	0.71	-0.25	0.21
	Perception of threats that cause species loss			
5.	Habitat loss is the major threat to the survival of cassowaries.	0.18	0.10	0.63
6.	How important a threat do you believe habitat clearing is to cassowaries?	-0.05	-0.06	0.88
7.	How important a threat do you believe habitat fragmentation is to cassowaries?	0.07	-0.04	0.77
	Value worth of cassowaries			
8.	Please specify the nature and intensity of your feelings for cassowaries by using the items and scales below, worthless.....valuable	0.27	0.60	0.04
9.	A healthy cassowary population represents a healthy environment.	-0.20	0.41	0.50
10.	How attractive do you consider cassowaries to be?	-0.10	0.93	-0.10

Note:

1) Entries in each cell are factor loading values.
2) Shaded cells identify items loading on the same factor.

Appendix B.4.5: Operationalisation of *Concern about the physical, economic, lifestyle and psychological well being of the self.*

(Local Egoistic/anthropocentric Concern)

Local issue - Protection/Conservation of Cassowaries

Issues	Question	Score	Source
1. Concern about the economic, lifestyle well being		**Total 10**	
Awareness of the consequences of implementing environmental protection of cassowaries-restrictions and regulations	If given the choice of conserving cassowaries and raising our standard of living, I would choose to raise our standard of living.	5	Kellert Section 2, Qs. 25
	I would accept any restrictions on land use activity due to cassowaries.	5	Kellert Section 2, Qs. 27
2. Concern about psychological well being		**Total 35**	
Awareness of the benefits of the cassowary to psychological well being	Please specify the nature and intensity of your feelings for cassowaries by using the items and scales below: sad.....happy distressed.....pleased dislike.....like indifferent.....fascinated nothing special.....privileged bored.....excited	30	Section 4C. Qs.10.
	Cassowaries symbolise to me the beauty of nature.	5	Section 2. Qs.2.

Note:

1) All items are scored of 5-point scale.

Appendix B.4.6: General/Global Issues - General Environmental Issues.

In addition to measuring *environmental* concern about specific/local issues, an important consideration in this research was the assessment of concern about more general issues such as pollution, wildlife in general and the Wet tropics environment. This *environmental* concern scale addresses these general issues from two perspectives, the ecocentric perspective - *concern for the well being of the natural environment* , and the egoistic/anthropocentric perspective - *concern about economic, lifestyle, and physical well being of self/others.*

Concern for the well being of the natural environment
(see Appendix B.4.7 for items)

(1) Perception of **risk/threat** to the natural environment:
awareness of risk/threats to the natural environment - four 5-point Likert items evaluate the extent to which respondents consider the survival of species in general to be at risk, the extent to which respondents evaluate the importance of pollution as a cause of environmental problems and the extent to which respondents evaluate the importance of humans as the cause of environmental degradation.

(2) **Value** worth:
awareness of the value worth of the natural environment - two 5-point Likert item identifies the extent to which respondents evaluate the value of some species to the ecosystem, and the fragility of the ecosystem

Concern about the economic, lifestyle, and physical well being of self/others

(1) Concern about economic and lifestyle well being:
awareness of the consequence of implementing environmental protection for the environment - restrictions and regulations - four 5-point Likert items measure respondents evaluation of the cost of restrictions/regulations/protection of the environment. Item-item intercorrelation ranged from 0.16 ($N = 320$, $p < 0.1$) to 0.33 ($N = 320$, $p < 0.001$). Kaiser's measure of variable sampling adequacy for total matrix of items was 0.65.
support for property rights - three 5-point Likert items measure the extent to which respondents support the issue of property rights.
right to modify environment - two 5-point Likert items measure the extent to which respondents support the rights of modifying the environment

(2) Concern about physical well being
awareness of the negative impact of environmental degradation/pollution on self and others - three 5-point Likert items measure respondents evaluation of the cost of the impact of environmental degradation and pollution of self and others. Item-item intercorrelation ranged from 0.18 ($N = 320$, $p < 0.1$) to 0.49 ($N = 320$, $p < 0.001$). Kaiser's measure of variable sampling adequacy for total matrix of items was 0.57.

In addition an exploratory factor analysis confirmed the presence of these two sub-categories (see Appendix B.4.8).

Appendix B.4.7: Operationalisation Of *Concern For The Well Being Of The Natural Environment.*

(General Ecocentric Concern)

General Issues - Species loss, pollution and natural environment

Component	Question	Score	Source
1. Perception of risk/threats to the environment		**Total 20**	
a) Awareness that the survival of species is at risk.	Over the next several decades, thousands of species will become extinct.	5	Section 1b.Qs.20
b).Awareness that pollution is a threat to the environment	Claims that current levels of pollution are changing the earth's climate are exaggerated.	5	Section 1b Qs.19
c) Awareness that humans are a threat to the environment	When humans interfere with the rest of nature it often produces diasterous consequences.	5	Section 1b.Qs.5
	Humans are severely abusing the environment.	5	Section 1b.Qs.12
2. Value Worth		**Total 15**	
a) Instrumental Value of natural environments	We would like you to try and explain in your own words your understanding of the Wet Tropic's ecosystem, i.e. what it is and how it functions.	5	Section 4C. Qs. 12 **Open-ended**
	Wildlife like goannas and white ants are of little value to nature	5	Section 4C. Qs.10.
	The balance of nature is very delicate and easily upset.	5	Section 1b. Qs.2

Note:

1) All items in clear cells were scored on a 5-point Likert scale.
2) Items in shaded cells were open-ended and excluded from factor analysis.
3) Open-ended items were dummy-coded: for example, an instrumental value was coded 5, absence of an instrumental value was coded 0.

Appendix B.4.8: Exploratory Factor Analysis of *Concern For The Well Being Of The Natural Environment.* *(General Ecocentric Concern)*

Items Organised into Two Dimensions resulting from Orthogonal Transformation Factor Analysis.

	Factors	
	1	2
EIGENVALUES:	2.16	1.0
Proportionate Variance Contributions:	36.0%	16.0%

	Awareness of risk/threat to the natural environment		
1.	Over the next several decades, thousands of species will become extinct.	0.75	0.06
2.	Claims that current levels of pollution are changing the earth's climate are exaggerated.	0.74	-0.05
3.	When humans interfere with the rest of nature it often produces diasterous consequences.	0.45	0.29
4.	Humans are severely abusing the environment.	0.69	0.32
	Awareness of the value worth of the natural environment		
5	Wildlife like goannas and white ants are of little value to nature.	-0.05	0.90
6.	The balance of nature is very delicate and easily upset.	0.37	0.44

Note:

1) Entries in each cell are factor loading values.
2) Shaded cells identify items loading on the same factor.

Appendix B.4.9: Operationalisation of *Concern about the physical, economic, and lifestyle well being of the self and others* in relation to general environmental issues.

(General Egoistic/Anthropocentric Concern)

General issue - Protection/Conservation of Environment

Issues	Question	Score	Source
Concern about physical, economic, lifestyle well being of self and others			
a) Awareness of the consequence of implementing environmental protection of natural environments	Protecting the environment will threaten jobs for people like me.	5	Section 1b, Qs. 13
	Laws to protect the environment limit my choices and personal freedom.	5	Section 1b, Qs. 14
	I (do not) approve of protecting wildlife if it hurts the economic livelihood of people who make a living off the land.	5	Section 2 Qs.20
b) Right to modify the environment	I would support wildlife if it did not restrict what I can do on my land.	5	Section 2, Qs. 1
	Humans have the right to modify the natural environment to suit their needs.	5	Section 1b, Qs. 3
c) Support for property rights	Among the fundamental rights in this country is the use of one's property without outside interference.	5	Section 1a, Qs. 12
	Property owners have the inherent right to use their land as they see fit.	5	Section 1a, Qs. 13
	Government restrictions on the use of private property are (not) necessary in order to insure that the land will not be permanently damaged.	5	Section 1a, Qs. 14
d) Awareness of negative impact of environmental degradation/pollution on the physical well being of self and others	A clean environment provides me with better opportunities for recreation.	5	Section 1b, Qs. 15
	The effects of pollution on public health are worse than we realise.	5	Section 1b, Qs. 17
	Pollution generated here harms people all over the world.	5	Section 1b, Qs. 18

Note:

1) All items in clear cells were scored on a 5-point Likert scale.

Appendix B.4.10: Exploratory Factor Analysis *Concern about physical, economic, and lifestyle costs to self and others.*

(General Egoistic/Anthropocentric Concern)

Items Organised into Four Dimensions resulting from ORTHOGONAL TRANSFORMATION SOLUTION Factor Analysis.

	Factors			
	1	2	3	4
EIGENVALUES:	2.98	1.5	1.09	1.0
Proportionate Variance Contributions:	29.0%	26.0%	24.0%	21.0%
Awareness of consequences to self/others of implementing environmental protection				
Protecting the environment will threaten jobs for people like me.	0.15	0.01	**0.72**	0.09
Laws to protect the environment limit my choices and personal freedom.	-0.07	0.11	**0.76**	0.27
I (do not) approve of protecting wildlife if it hurts the economic livelihood of people who make a living off the land.	0.33	0.13	**0.47**	0.02
Right to Modify the Environment				
I would support wildlife if it did not restrict what I can do on my land.	0.28	-0.01	0.16	**0.71**
Humans have the right to modify the natural environment to suit their needs. (NEP3)	0.00	-0.26	0.17	**0.71**
Support for property rights				
Among the fundamental rights in this country is the use of one's property without outside interference. (DSP12)	**0.80**	0.06	-0.04	0.24
Property owners have the inherent right to use their land as they see fit. (DSP13)	**0.84**	-0.03	0.17	0.13
Government restrictions on the use of private property are (not) necessary in order to insure that the land will not be permanently damaged. (DSP 14)	**0.58**	-0.34	0.27	-0.14
Awareness of negative impact of environmental degradation on physical well being of self/others				
A clean environment provides me with better opportunities for recreation. (Stern 15)	-0.11	**0.64**	-0.27	0.17
The effects of pollution on public health are worse than we realise. (Stern 17)	-0.01	**0.81**	0.04	-0.22
Pollution generated here harms people all over the world. (Stern 18)	-0.05	**0.67**	-0.03	-0.35

Note:

1) Entries in each cell are factor loading values.
2) Shaded cells identify items loading on the same factor.

Appendix B.4.11: Resident Community Differences in *Concern for the well being of cassowaries.*

Concern DIMENSIONS	Rural (N = 35)	Semiurban (N = 143)	Urban (N = 142)	**Total Study Population (N = 320)**	f	p
Perception of risk to survival of species (RR = 1-20)	15.4 (4.19)	16.49 (3.960	16.13 (3.18)	**16.21 (3.66)**	1.31	0.271 NS
Perception of threats that cause species loss (RR = 1-15)	12.11 (2.98)	12.99 (2.34)	11.44 (2.2)	**12.21 (2.46)**	15.32	0.0001
Need for action-Protection (RR = 0-5)	0.57 (1.61)	1.68 (2.37)	1.16 (2.12)	**1.33 (2.21)**	4.33	0.014
Value Worth of the species (RR = 1-35)	21.97 (5.4)	21.94 (5.37)	18.25 (6.1)	**20.13 (5.99)**	16.59	0.0001
TOTAL Concern Score (RR =1-75)	**50.06 (10.24)**	**53.1 (9.79)**	**46.89 (10.12)**	**50.01 (10.38)**	**13.75**	**0.0001**

Note: **RR = Response Range, NS = Not Significant**

1) Entries in columns 2 to 5 are response means, with standard deviations in parentheses.
2) Entries in columns 6 and 7 are f and p values from ANOVA analyses.
3) Shaded cells refer to total survey population and total concern scores.
4) N = Survey population size.

Appendix B.4.12: Intercorrelation Matrix of *Concern for the well being of cassowaries.*

Concern Dimensions	**Composite Concern Score**	Perception of risk of species loss	Perception of threats that cause species loss	Need for Action - protection	Value Worth of the Species
Perception of risk of species loss	**0.74** *** **r^2= 0.56**	1			
Perception of threats that cause species loss	**0.69** *** **r^2= 0.48**	**0.57** ***	1		
Need for Action - protection	**0.42** *** **r^2= 0.17**	**0.21** *	**0.19** *	1	
Value Worth of the Species	**0.82** *** **r^2= 0.67**	**0.34** ***	**0.35** ***	0.13	1

Note: * **= Significant at 0.05.** ** **= Significant at 0.01.**
*** **= Significant at 0.001**

1) Main entry in each cell is Pearson's correlation coefficient r.
2) The square of Pearson's correlation coefficient (r^2) is presented in column 2 in addition to Pearson's r.
3) Shaded cells refer to dimension- total score correlations.
4) Bold face identifies statistically significant relationships.
5) Asterisks identifies level of significance.

Appendix B.4.13: Education Level Differences in *Concern for the well being of cassowaries.*

Concern DIMENSIONS	Primary (n = 28)	Secondary (n = 129)	TAFE (n = 62)	University (n = 98)	f	p
Perception of risk to survival of species (RR = 1-20)	14.32 (4.11)	15.95 (3.76)	17.47 (2.71)	16.65 (3.06)	6.37	0.0003
Perception of threats that cause species loss (RR = 1-15)	11.39 (2.56)	12.20 (2.73)	12.97 (2.22)	12.03 (2.07)	3.25	0.022
Need for action-Protection (RR = 0-5)	0.89 (0.95)	0.97 (1.98)	1.77 (2.41)	1.68 (2.38)	3.22	0.023
Value Worth of the species (RR = 1-35)	18.46 (6.12)	20.78 (5.75)	22.00 (5.9)	19.28 (6.03)	3.89	0.009
TOTAL Concern Score (RR =1-75)	**45.07 (9.76)**	**49.91 (10.2)**	**54.21 (9.07)**	**49.64 (9.96)**	**6.06**	**0.0005**

Note: **RR = Response Range, NS = Not Significant**

1) Entries in columns 2 to 5 are response means, with standard deviations in parentheses.
2) Entries in columns 6 and 7 are f and p values from ANOVA analyses.
3) Shaded cells refer to total concern scores.
4) N = Survey population size.

Appendix B.4.14: Income Level Differences in *Concern for the well being of cassowaries.*

Income Levels

Concern DIMENSIONS	<10 n = 46	10<20 n = 36	20<30 n = 71	30<40 n = 51	40<50 n = 33	>50 n = 55	f	p
Perception of risk to survival of species (RR = 1-20)	16.57 (3.47)	16.89 (4.07)	16.63 (2.97)	16.12 (3.28)	16.52 (3.36)	16.22 (3.39)	0.32	0.898 NS
Perception of threats that cause species loss (RR = 1-15)	12.57 (2.23)	13.36 (2.38)	12.56 (2.48)	11.76 (2.29)	11.58 (2.45)	12.00 (1.99)	3.21	0.007
Need for action-Protection (RR = 0-5)	1.09 (2.09)	1.25 (2.20)	1.48 (2.30)	1.57 (2.34)	1.67 (2.39)	1.09 (2.08)	0.57	0.7247 NS
Value Worth of the species (RR = 1-35)	22.02 (5.71)	22.17 (6.37)	20.76 (5.75)	19.22 (5.76)	19.61 (6.26)	18.91 (5.91)	2.61	0.025
TOTAL Concern Score (RR =1-75)	**52.24 (10.02**	**53.67 (9.93)**	**51.44 (9.33)**	**48.67 (10.51**	**49.36 (10.91**	**48.22 (9.73)**	**2.13**	**0.062 NS**

Note: **RR = Response Range, NS = Not Significant**

1) Entries in columns 2 to 7 are response means, with standard deviations in parentheses.
2) Entries in columns 8 and 9 are f and p values from ANOVA analyses.
3) Shaded cells refer to total concern scores.
4) N = Survey population size.

Appendix B.4.15: Resident Community Differences in *Concern about the economic, lifestyle, and psychological well being.*

Concern DIMENSIONS	Rural (N = 35)	Semiurban (N = 143)	Urban (N = 142)	**Total Study Population (N = 320)**	f	p
Concern about the economic and lifestyle costs (RR = 1-10)	5.57 (2.63)	5.32 (2.32)	5.46 (1.97)	**5.41 (2.2)**	0.24	0.785 NS
Concern about psychological well being (RR = 1-35)	28.40 (5.59)	30.03 (4.36)	24.99 (5.91)	27.61 (5.74)	33.50	0.0001

Note: RR = Response Range, NS = Not Significant

1) Entries in columns 2 to 5 are response means, with standard deviations in parentheses.
2) Entries in columns 6 and 7 are f and p values from ANOVA analyses.
3) Shaded cells refer to total survey population scores.
4) N = Survey population size.

Appendix B.4.16: Education Level Differences in *Concern about the economic, lifestyle, and psychological well being.*

Concern DIMENSIONS	Primary (n = 28)	Secondary (n = 129)	TAFE (n = 62)	University (n = 98)	f	p
Concern about the economic and lifestyle costs (RR = 1-10)	6.29 (1.92)	5.40 (2.33)	5.06 (2.19)	5.36 (2.06)	2.03	0.11 NS
Concern about psychological well being (RR = 1-35)	27.64 (5.18)	28.12 (5.84)	29.87 (4.87)	25.44 (5.64)	8.84	0.0001

Note: RR = Response Range, NS = Not Significant

1) Entries in columns 2 to 5 are response means, with standard deviations in parentheses.
2) Entries in columns 6 and 7 are f and p values from ANOVA analyses.
3) N = Survey population size

Appendix B.4.17: Income Level Differences in *Concern about the economic, lifestyle, and psychological well being.*

Income Levels

Concern DIMENSIONS	<10 n = 46	10<20 n = 36	20<30 n = 71	30<40 n = 51	40<50 n = 33	>50 n = 55	f	p
Concern about the economic and lifestyle costs (RR = 1-10)	4.72 (2.07)	4.94 (2.39)	5.42 (2.33)	5.47 (2.25)	5.91 (1.94)	5.71 (2.02)	1.79	0.115 NS
Concern about psychological well being (RR = 1-35)	29.78 (5.40)	29.28 (5.13)	28.15 (5.60)	25.92 (5.95)	26.82 (4.71)	25.84 (5.26)	4.61	0.001

Note: **RR = Response Range, NS = Not Significant**

1) Entries in columns 2 to 5 are response means, with standard deviations in parentheses.
2) Entries in columns 6 and 7 are f and p values from ANOVA analyses.
3) N = Survey population size.

Appendix B.4.18 Resident Community Differences in *Concern for the well being of the natural environment.*

(General Ecocentric Concern)

Concern DIMENSIONS	Rural (N = 35)	Semiurban (N = 143)	Urban (N = 142)	Total Study Population (N = 320)	f	p
Awareness of the risk/threats to natural environment (RR = 1-20)	15.66 (4.2)	15.67 (3.26)	16.42 (2.77)	**16.00 (3.18)**	2.24	0.108 NS
Awareness of the Value Worth of the natural environment (RR = 1-15)	11.80 (3.30)	12.14 (3.12)	12.13 (2.73)	**12.10**	0.2	0.822 NS
TOTAL Concern Score (RR =1-35)	**27.46 (6.36)**	**27.81 (5.02)**	**28.55 (4.25)**	**28.1 (4.87)**	**1.16**	**0.314 NS**

Note: **RR = Response Range, NS = Not Significant**

1) Entries in columns 2 to 5 are response means, with standard deviations in parentheses.
2) Entries in columns 6 and 7 are f and p values from ANOVA analyses.
3) Shaded cells refer to total survey population and concern scores.
4) N = Survey population size.

Appendix B.4.19: Education Level Differences in *Concern for the well being of the natural environment.*

Concern DIMENSIONS	Primary (n = 28)	Secondary (n = 129)	TAFE (n = 62)	University (n = 98)	f	p
Awareness of the risk/threats to natural environment (RR = 1-20)	15.32 (2.71)	15.98 (3.55)	17.05 (2.91)	15.69 (2.73)	3.09	0.028
Awareness of the Value Worth of the natural environment (RR = 1-15)	10.79 (2.78)	11.83 (3.10)	12.47 (2.84)	12.67 (2.76)	3.83	0.0108
TOTAL Concern Score (RR =1-35)	**26.11 (4.01)**	**27.81 (5.55)**	**29.52 (4.24)**	**28.35 (4.06)**	**3.71**	**0.012**

Note: **RR = Response Range, NS = Not Significant**

1) Entries in columns 2 to 5 are response means, with standard deviations in parentheses.
2) Entries in columns 6 and 7 are f and p values from ANOVA analyses.
3) Shaded cells refer to total concern scores.
4) N = Survey population size.

Appendix B.4.20: Income Level Differences in *Concern for the well being of the natural environment.*

Income Levels

Concern DIMENSIONS	<10 n = 46	10<20 n = 36	20<30 n = 71	30<40 n = 51	40<50 n = 33	>50 n = 55	f	p
Awareness of the risk/threats to natural environment (RR = 1-20)	16.54 (3.12)	17.03 (3.25)	16.24 (3.13)	15.82 (3.22)	15.42 (3.46)	15.67 (2.52)	1.47	0.199 NS
Awareness of the Value Worth of the natural environment (RR = 1-15)	11.70 (2.64)	12.17 (3.06)	12.35 (2.85)	12.86 (2.58)	12.58 (2.67)	11.93 (3.18)	1.07	0.376 NS
TOTAL Concern Score (RR =1-35)	**28.24 (4.60)**	**29.19 (4.83)**	**28.59 (4.830**	**28.69 (4.55)**	**28.00 (4.66)**	**27.60 (4.63)**	**0.65**	**0.665 NS**

Note: **RR = Response Range, NS = Not Significant**

1) Entries in columns 2 to 7 are response means, with standard deviations in parentheses.
2) Entries in columns 8 and 9 are f and p values from ANOVA analyses.
3) Shaded cells refer to total concern scores.
4) N = Survey population size.

Appendix B.4.21: Resident Community Differences in *Concern about physical, economic, and lifestyle costs to self and others.*

(General Egoistic/Anthropocentric Concern)

Concern DIMENSIONS	Rural (N = 35)	Semiurban (N = 143)	Urban (N = 142)	**Total Study Population (N = 320)**	f	p
Awareness of consequences to self/others of implementing environmental protection (RR = 1-15)	7.26 (3.21)	7.73 (2.76)	6.98 (2.57)	7.35 (2.74)	2.75	0.065 NS
Support for property rights (RR = 1-15)	10.20 (3.59)	8.93 (3.28)	8.08 (2.95)	8.69 (3.23)	6.99	0.001
Awareness of negative impact of environmental degradation on physical well being of self/others (RR = 1-15)	12.60 (2.860	12.88 (2.20)	12.89 (2.20)	12.85 (2.28)	0.24	0.785 NS
Right to modify (RR = 1-10)	5.91 (2.16)	5.88 (2.37)	5.52 (2.25)	5.72 (2.300	1.01	0.366 NS

Note: RR = Response Range, NS = Not Significant

1) Entries in columns 2 to 5 are response means, with standard deviations in parentheses.
2) Entries in columns 6 and 7 are f and p values from ANOVA analyses.
3) Shaded cells refer to total survey population scores.
4) N = Survey population size.

Appendix B.4.22: Education level differences in *Concern about physical, economic, and lifestyle costs to self and others.*

(General Egoistic/Anthropocentric Concern)

Concern DIMENSIONS	Primary (n = 28)	Secondary (n = 129)	TAFE (n = 62)	University (n = 98)	f	p
Awareness of consequences to self/others of implementing environmental protection (RR = 1-15)	8.50 (3.04)	7.47 (2.83)	6.90 (2.70)	7.10 (2.49)	2.57	0.054 NS
Support for property rights (RR = 1-15)	10.46 (3.00)	9.32 (3.25)	7.90 (3.17)	7.78 (2.89)	8.99	0.0001
Awareness of negative impact of environmental degradation on physical well being of self/others (RR = 1-15)	12.43 (2.46)	13.01 (2.24)	13.73 (1.63)	12.27 (2.44)	5.99	0.0006
Right to modify (RR = 1-10)	6.82 (2.31)	5.74 (2.34)	5.31 (2.29)	5.62 (2.17)	2.94	0.033

Note: RR = Response Range, NS = Not Significant

1) Entries in columns 2 to 5 are response means, with standard deviations in parentheses.
2) Entries in columns 6 and 7 are f and p values from ANOVA analyses.
3) N = Survey population size.

Appendix B.4.23: Income Level Differences in *Concern about physical, economic, and lifestyle costs to self and others.*

Income Levels

Concern DIMENSIONS	<10 n = 46	10<20 n = 36	20<30 n = 71	30<40 n = 51	40<50 n = 33	>50 n = 55	f	p
Awareness of consequences to self/others of implementing environmental protection (RR = 1-15)	7.02 (2.85)	7.36 (3.06)	6.90 (2.85)	7.43 (2.53)	7.91 (2.35)	7.56 (2.61)	0.86	0.507 NS
Support for property rights (RR = 1-15)	8.80 (3.20)	8.42 (3.64)	8.49 (3.14)	8.30 (3.31)	8.55 (2.59)	8.82 (3.41)	0.21	0.959 NS
Awareness of negative impact of environmental degradation on physical well being of self/others (RR = 1-15)	13.22 (1.93)	13.19 (2.42)	13.15 (2.18)	12.86 (2.47)	12.61 (2.42)	12.31 (2.17)	1.36	0.240 NS
Right to modify (RR = 1-10)	5.65 (2.45)	5.59 (2.41)	5.54 (2.25)	5.88 (2.19)	5.79 92.51)	5.98 (2.00)	0.37	0.868 NS

Note: **RR = Response Range, NS = Not Significant**

1) Entries in columns 2 to 7 are response means, with standard deviations in parentheses.
2) Entries in columns 8 and 9 are f and p values from ANOVA analyses.
3) N = Survey population size.

APPENDIX B.5.
Analyses: Environmental Activity

Appendix B.5.1: Correlations involving Cassowary-Specific Indicators of Environmental Activity.

	Indicators of Environmental Activity: Cassowary Specific					
	Intention to Accept/ Support	**Total Prior Activity Score**	Inform People	Direct Activity	Group Activity	Lobby Govt. etc.
Attitude toward Cassowaries						
Cognitive	**0.45*** **	**0.23***	0.23*			
Affective	**0.53*** **	**0.39*** **	0.38***		0.29**	0.33**
Conative	-	**0.39*** **	0.31**	0.20*	0.26**	0.28**
TOTAL	-	**0.40*** **	0.39***		0.30**	0.32**
Information about Cassowaries						
	0.33**	**0.39*** **	0.27**	0.29**	0.32**	0.27**
***Environmental* Concern: Cassowary-Specific**						
Ecocentric: Concern for cassowary well being	**0.53*** **	**0.41*** **	0.38***	0.28**	0.30**	0.30**
Anthropocentric:Concern about Economic/lifestyle well being	-	**-0.33****	-0.29**		-0.25*	-0.27**
Anthropocentric: Concern about Psychological well being	**0.42*** **	**0.27****	0.28**		0.22*	0.21*

Note: * = **Significant at 0.05;** ** = **Significant at 0.01;** *** = **Significant at 0.001**

Appendix B.5.2: Multiple Regression Analysis of Indicators of Cassowary Specific Environmental Activity.

Cassowary Specific Indicators of Environmental Activity						
	Intention to Accept/ Support			*Prior Environmental Activity*		
	$r^2 = 0.40$ [F(5,172) = 23.25, p = 0.0001]			$r^2 = 0.27$ [F(6,168) = 10.22, p =0.0001]		
Predictors	β	p	partial F	β	p	partial F
Attitude toward Cassowaries						
Cognitive	0.22	0.001	10.72			
Affective	0.39	0.003	9.22	0.35	0.02	5.42
Information about Cassowaries						
	0.14	0.037	4.40	0.25	0.0007	12.004
***Environmental* Concern**						
Ecocentric: Concern for cassowary well being	0.24	0.003	9.45	0.19	0.04	4.23
Anthropocentric: Concern about Psychological well being				0.26	0.05	3.81
Note: Only significant predictor variables have been included.						

Appendix B.5.3: Correlations involving Indicators of Environmental Activity: General Environmental Issues.

	Indicators of Environmental Activity: General Environmental Issues					
	Intention to Accept/ Support	**Total Prior Activity Score**	Inform People	Direct Activity	Group Activity	Lobby Govt. etc.
Attitude toward 'Other' Wildlife						
Cognitive	**0.44*** **					
Affective	**0.23** **					
Conative	**0.35*** **	**0.28** **	0.26**	0.24*	0.21*	0.20*
TOTAL	**0.45*** **	**0.25***			0.20*	0.22
Information about 'Other' Wildlife and Environmental Issues						
		0.22*	0.21*	0.27**		
***Environmental* Concern: General Environmental Issues**						
Ecocentric: Concern for well being of the environment	**0.25***	**0.25***	0.20*		0.24*	0.22*
Anthropocentric: Concern about own physical well being	**0.31** **					
Anthropocentric: Concern about protection strategies	**-0.34*** **	**-0.31** **	-0.31**	-0.23*	-0.25*	
Anthropocentric: Concern about private property rights	**-0.24***					
Anthropocentric: Concern about rights to modify environment	**-0.31** **					
Dominant Social Paradigm						
Laissez-faire Government	**-0.22***					
Status Quo						
Private Property Rights	**-0.33*** **	**-0.24***	-0.22*		-0.22*	
Science & Technology		**-0.27** **			-0.27**	-0.20
Individual Rights						
Economic Growth		**-0.32** **	-0.28**	-0.30**	-0.26**	
Material Abundance						
Future Prosperity		**-0.22***				
TOTAL	**-0.34*** **	**-0.34*** **	-0.30**	-0.24*	-0.28**	-0.25*
New Environmental Paradigm						
Limited Resilience	**0.28** **					
Respect with non interference	**0.36*** **					
Humanity not over nature	**0.33*** **					
TOTAL		**0.22***				

Note: * = Significant at 0.05; ** = Significant at 0.01; *** = Significant at 0.001

Appendix B.5.4: Multiple Regression Analysis of Environmental Activity. General Environmental Issues.

Indicators of Environmental Activity: General Environmental Issues

	Intention to Accept / Support			*Prior Environmental Activity*		
	$r^2 = 0.31$ [F(4,135) = 14.92, p = 0.0001]			$r^2 = 0.23$ [F(3,136) = 13.76, p =0.0001]		
Predictors	β	p	partial F	β	p	partial F
Attitude toward 'Other' Wildlife						
Cognitive	0.27	0.001	11.007			
***Environmental* Concern: General Environmental Issues**						
Ecocentric: Concern for well being of the environment				0.24	0.002	10.07
Anthropocentric: Concern about own physical well being	0.16	0.04	4.13			
Anthropocentric: Concern about protection strategies	-0.23	0.002	9.67	-0.23	0.004	8.68
Dominant Social Paradigm						
Private Property Rights	-0.19	0.01	6.17			
Economic Growth				-0.31	0.0001	16.91

Note: Only significant predictor variables have been included.