

**MARKET-BASED INSTRUMENTS FOR ECOSYSTEM SERVICE  
PROVISION IN SOUTHERN ALBERTA: AN EXPLORATION OF  
LANDOWNERS' PERSPECTIVES**

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MARKET-BASED INSTRUMENTS FOR ECOSYSTEM SERVICE PROVISION IN SOUTHERN  
ALBERTA: AN EXPLORATION OF LANDOWNERS' PERSPECTIVES

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## DEDICATION

I dedicate this thesis to my parents, Gail Carlson, Dave Howard and Judy DeMong, who instilled my desire for knowledge and appreciation of nature, and provided me with endless support throughout my academic career. I would also like to dedicate it to my girlfriend, Ashley, without whom I would still be locked in my basement trying to finish writing this damned thing.

I hope whatever merit derived from this thesis contributes to the welfare of the environment and all people within it, and encourages further research and knowledge sharing to foster a sustainable future.

## ABSTRACT

With increased industrial, urban, and agricultural development, the capacity for ecosystems to produce Ecosystem Services (ES) in southern Alberta is under pressure. Market-Based Instruments (MBIs) are proposed to entice landowners to participate in ES provision programs. Due to the voluntary nature of these programs, it is necessary to identify the level of incentive needed to attract participants. From a survey in the Oldman River Basin, this study classified rural landowners into three groups based on their value orientations; each requiring different levels of financial incentive to participate in MBI programs. Additional non-payment benefits to participating also reduced the incentive requirements. The willingness of landowners to participate in these programs to protect water quality was explained using Theory of Planned Behaviour (TPB) variables, past behaviour, percent of income gained from land use, and generations of a family owning the land, which were significant variables in a regression model.

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Finally, I would like to thank my officemates for always being there to help solve problems, the King household for keeping me entertained, and my roommates for introducing me to a hobby to keep me sane.

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## *CHAPTER ONE*

### **1 INTRODUCTION**

With growing populations and increasing economic development, governments around the world are being forced to deal with the pressures these activities are putting on the environment, which reduce the benefits we enjoy from healthy ecosystems. The Millennium Ecosystem Assessment (MEA) reported that aquatic ecosystems are degrading more rapidly than other ecosystems from these pressures (MEA 2005). Even in Canada, which is known for its natural wilderness and has the third largest supply of fresh water in the world (Gleick et al. 2009), the pressures of human activity within ecosystems has been felt.

During the Walkerton Tragedy of 2000, thousands of people became ill and several died because drinking water had become contaminated with *E. coli* from farm runoff (O'Connor 2002a). Following an inquiry into the incident, and a similar one in North Battleford water contamination case in 2001, multiple barrier approaches to water protection were stressed, beginning with source water protection (O'Connor 2002b, Johnston and Fraser 2006). With source water protection, instead of focussing solely on water treatment, improvements of land and water management within a catchment are conducted to ensure healthy ecosystems and quality water. New York City has been able to prevent spending billions of dollars to incorporate filtration methods into their drinking water by using a source water protection approach (Smith and Porter 2010). In addition to less stress on water treatment facilities, healthier ecosystems within the catchment can provide multiple other services that are beneficial to the residents, such as recreation, aesthetic value, and wildlife habitat.

In Alberta, the Water for Life Strategy (WFL) set out to provide a province wide strategy to ensure fresh water resources will be available to meet the needs for drinking water, economic development, and to provide healthy ecosystems for future generations to enjoy. The Land Use Framework (LUF) created the requirement for regional plans to be developed and implemented for the management of land use and scarce water resources. The regions generally align with the water basins of Alberta's major rivers, and at a smaller watershed level watershed advisory and planning councils and water stewardship groups are working on water planning under the WFL strategy. Under the LUF an integrated cumulative effects approach is being taken to protect the health of the environment and protect source water. With little political appetite for command and control methods of achieving environmental goals, both the WFL and LUF stress the concept of 'ecosystem services' and the need to incorporate them into private land managers' decision making through the use of voluntary market-based instruments. It is the point of this research to determine if southern Albertan landowners are willing to participate in such programs.

### **1.1 Ecosystem Services**

Ecosystem Services (ES), by a broad definition, are all the benefits people obtain from ecosystems, whether they are marketable or not. ES are economic, social, and often intrinsic benefits resulting from the natural processes of a healthy environment and biodiversity, which are essential to sustain a healthy and prosperous way of life (GoA 2008). ES are broken down into four categories: 1) provisioning services such as food and water; 2) regulating services such as regulation of floods, drought, land degradation, and disease; 3) supporting services such as soil formation and nutrient cycling; and 4)

cultural services such as recreation, spiritual, religious, and other nonmaterial benefits (MEA 2005).

Wetlands and other aquatic ecosystems deliver a wide range of services that contribute to human well-being, such as wildlife and vegetation, water supply, water purification, climate regulation, flood regulation, shoreline protection, recreational opportunities, and tourism (MEA 2005). The primary direct drivers of degradation and loss of inland and coastal wetlands identified in the MEA are: i) infrastructure development, ii) land conversion, iii) water withdrawal, iv) eutrophication and pollution, v) overharvesting and overexploitation, and vi) the introduction of invasive alien species. The primary indirect drivers are population growth and increasing economic development (MEA 2005).

In semi-arid southern Alberta, aquatic and riparian ecosystems are central to healthy environments because they provide a large portion of the ES people benefit from (Patten 1998). From an ES assessment of southern Alberta, the six most important services were found to be i) biological control, ii) erosion control and sediment retention, iii) water supply, iv) water regulation, v) nutrient cycling, and vi) disturbance regulation (GoA 2007). Many of these can be provided through ES related to water. The attributes of water are affected by natural or human processes as it flows through the rest of the watershed into the waterways (Brauman et al. 2007, Baron et al. 2002). Therefore, all ecosystems within a watershed perform hydrological services that affect downstream users. However, household, city, industrial, and agricultural activities performed within these watersheds also affect downstream users, but usually in a negative way.

These human activities are in some way beneficial to society, but in many instances the loss of the ES benefits society enjoys are not considered in the decisions made by

private individuals. The southern Alberta ES assessment found that the expansion of anthropocentric assets at the expense of natural cover types negatively affects the ability of ecosystems to produce a wide range of ES, which in the long term requires substantial external inputs such as fuel and fertilizer in agriculture to offset the loss (GoA 2007). Since most ES other than what can be harvested tend not to be marketable, and some may not directly benefit the landowner where the ES originate, they are not fully considered in private decision making and are often under-produced according to the needs of society. Therefore, the challenge for policy makers is to find ways to influence land users to internalize the benefits of these services, as well as the cost of damaging ecosystems, into the private decision making so an adequate amount of ES is supplied to ensure healthy ecosystems and quality water for use in the economy and by society and the environment.

## **1.2 Market-Based Instruments**

A Market-Based Instrument (MBI) is often based on voluntary participation (Wunder 2007), and shapes behaviour through price signals rather than explicit instructions (Hockenstein et al. 1997). As an environmental policy tool, MBIs aim to internalize the public benefits into private decision making in order to achieve the desired environmental goals. Although most do not consist of a true market, MBIs attempt to provide a financial value to a non-market good. So if there is a greater public demand for ES than being supplied by private lands, MBIs can provide financial incentive to those landowners to increase their land's ES provision. In general, there are three types of MBIs: (1) price-based instruments such as taxes, fees or Payments for Ecosystem Services (PES), which are themselves sometimes used as an umbrella term for MBIs (Jack et al. 2008); (2) rights-based instruments such as tradable permits, offset schemes and reverse auction

markets; and (3) market friction instruments which aim to improve the existing market, such as eco-labelling (Henderson and Norris 2008).

Governments have traditionally relied on a 'Command and Control' (CAC) style of environmental regulation to achieve environmental goals (Hahn and Stavins 1991). However, many have found CACs to be too rigid and costly to implement as they force all firms to achieve the same level of mitigation, even though it may be relatively more costly for some firms than others (Portney 2003, Hockenstein et al. 1997, Keohane et al. 1998). The inefficiencies of CACs gave rise for economists to advocate the use of MBIs to meet environmental objectives by utilizing the cost heterogeneities between firms to minimize overall cost of achieving the objectives (Newell and Stavins 2003).

MBIs, however, have had mixed success. Many have not operated as well as predicted since programs were based on ideal conditions or failed to: consider political factors; incorporate transaction costs; remove uncertainty of property rights; provide a competitive market; provide appropriate incentives to participate; or take into account the "inability of firms to fully take advantage of the program opportunities because of flaws in their internal decision-making processes" (Hockenstien et al. 1997, p. 18). However, if implemented properly, MBIs can be useful in increasing the provision of ES. In Alberta's WFL and LUF, MBIs have been promoted as tools to explore that may help internalize the public's need for ES into private landowner's decision making.

### **1.3 Research Question**

The problem of adopting new MBI programs for ES provision is that they are a relatively new policy tool and have been untested in southern Alberta. It is not clear how willing the landowners are to accept the use of the instruments or if they will participate

in these voluntary programs, although such information would be very beneficial for the creation of successful ES programs. The field of economics has multiple methods of calculating their willingness to participate but the models tend to focus on the willingness itself and less on why the landowners are willing. The fields of social psychology and sociology try to understand the ‘why’ by identifying the influence of a person’s attitudes and values on their actions, more of which will be discussed in the Chapter Two. Combining some economic and psychological methods together, this study aimed at answering the following research question: what factors affect the willingness of landowners to participate in MBI programs for ES provision?

#### **1.4 Research Objectives and Hypotheses**

This is a relatively new area of study, especially in Alberta, so several research objectives were required to answer the question. On the basis of a review of related research, it was decided that the following objectives must be achieved in order to answer the research question:

- (1) Identify different groups of landowners based on the values that influence their decision making;
- (2) Discover if the willingness to participate in MBI programs for ES provision differs across the landowner groups;
- (3) Determine if other non-payment benefits influence the willingness to participate and if that influence differs between the landowner groups; and

(4) Discover personal, land, and situational factors that most strongly influence landowners' willingness to participate in MBI programs for water quality supportive ES provision.

To address the four research objectives, six hypotheses were tested within three spheres of research using data gathered from a phone-survey of rural landowners in southern Alberta. The first sphere addressed the first research objective by using cluster analysis and chi-square tests to test the following hypothesis:

H<sub>1</sub>: Landowners do not have uniform values that influence their decisions.

Instead, landowners can be clustered into distinct value orientation groups based on the importance they place on three value types: economic, environmental, and lifestyle.

H<sub>2</sub>: Members of each value orientation group have different land and personal characteristics.

The second sphere of research addressed the second and third objectives by examining the financial compensation landowners require in order to participate in MBI programs for ES provision. The following three hypotheses were tested:

H<sub>3</sub>: Members of each value orientation group require a different financial compensation to participate in MBI programs for the provision of ES.

H<sub>4</sub>: Scenarios that contain different combinations of environmental, lifestyle, and economic benefits from participating in MBI programs for ES provision cause landowners to require different financial compensations.

H<sub>5</sub>: The changes in financial compensation required by landowners to participate in MBI programs for ES provision caused by the different benefit scenarios vary between the value orientation groups.

The third sphere addressed the fourth objective by using regression analysis to determine which variables explain the variation in southern Albertan landowners' agreement to the use of MBIs for ES provision to protect water quality. The Theory of Planned Behaviour (TPB), which is expanded on in Chapter 2, claims to encompass the factors that influence willingness to perform a behaviour through measuring certain beliefs a person may hold in relation to the behaviour so this model was used to accomplish this objective. Other variables often included in expanded TPB models, as well as numerous socio-demographic characteristics of the landowners and their land, were also incorporated as control variables to test the final hypothesis:

H<sub>6</sub>: The TPB variables are significant in explaining the variance of the landowners' agreement that MBIs should be used for water quality supportive ES provision.

## **1.5 Thesis Organisation**

The thesis is organised in six chapters. Chapter 2 provides a literature overview to provide an understanding of the water and environmental issues in southern Alberta and the use of MBIs for ES provision. The chapter also provides reasoning for using belief systems and the theory of planned behaviour to understand rural landowners' willingness to participate in these MBI programs. Chapter 3 presents the location of the study area and provides further information of the environmental issues and other land use factors.

The chapter then explains the methods used to collect the data and achieve the research objectives. Chapter 4 lays out the results from the three spheres of research, providing tables and explanations of the information when necessary. Chapter 5 discusses the results in the previous chapter and how they relate to the hypotheses and previous literature. Chapter 6 concludes the thesis with a synthesis of the major results, the policy implications for the use of MBIs to provide ES for water quality protection in southern Alberta, limitations of the research, and recommendations for future research. The remaining sections include the list of references and the appendices, which include the interview schedule and questionnaires used to collect the data to make this thesis possible.

## *CHAPTER TWO*

### **2 ALBERTA'S CALL FOR THE USE OF MARKET-BASED INSTRUMENTS FOR ECOSYSTEM SERVICE PROVISION AND LANDOWNERS WILLINGNESS TO PARTICIPATE**

The overall goal of this chapter is to provide background on the potential use of MBIs in environmental policy to increase the provision of ES in Alberta in order to protect water quality and also to review environmental behaviour literature to understand southern Albertan landowners' willingness to participate in such voluntary MBI programs. The first section describes water use and its effect on the ecosystems in southern Alberta, the concepts and growth of ES and MBIs as environmental policy tools and how they fit into current Alberta water and land use policy to provide healthy ecosystems and source water protection. The chapter then explains the components of the value-attitude-behaviour hierarchy to provide a theoretical understanding of why people behave in certain ways, as well as introduce the concept of value orientations. This is beneficial because with voluntary programs, the government cannot force landowners to participate, but knowing what drives their behaviour can help identify the proper incentive they would require. The TPB is outlined to show how landowners' decisions to participate in MBI programs for ES can be explained through specific attitudes and beliefs about the situation. A conceptual framework is built at the end of the chapter, using the TPB, value orientations, and situational factors to achieve the research objectives.

## **2.1 Alberta, Water, and Healthy Ecosystems**

Since Alberta's beginning people have had to deal with water shortages and continue to do so today. Roughly 80% of the water is in the northern half of the province while 80% of the population and most of the economic activity are in the semi-arid south (GoA 2002). Water is therefore a limiting factor in southern Alberta for both human activity and for healthy ecosystems. Irrigation development starting in the early 20<sup>th</sup> century reduced this limitation for agricultural activities, making Alberta a centre for livestock production in Canada and it has given farmers the ability to grow crops that require larger water inputs than rain can provide. However, irrigation is the largest user of water in Alberta, accounting for 60 to 65 percent of the total water consumed on average (GoA 2014a), and it accounts for 88% of total allocation in the Oldman River Basin (ORB) (Rock and Mayer 2006).

Water is over-allocated in the South Saskatchewan River Basin (SSRB), so during a drought, like in 2001/2002, junior water license holders may not be able to use their allotted amount, and water for ecosystem function have even less priority (GoA 2008a). The 1969 Master Agreement on Apportionment between the provinces of Alberta, Saskatchewan, and Manitoba provides some restriction on the amount of water that can be consumed, because it requires at least 50% of the natural flow of the SSRB, as well as from other interprovincial watercourses, must enter Saskatchewan at the border (PPWB 2014). However, there is no policy in Alberta regarding the amount of water a sub-basin within an interprovincial watercourse must supply to the Saskatchewan appropriation, as long as an adjoining sub-basin makes up the difference (GoA 2006). This allows for more use in one sub-basin than another, so ecosystem functions can become stressed in areas.

With heavy irrigation demands in the ORB, assessments of aquatic and riparian conditions have shown numerous areas within the sub-basin to be assessed as ‘healthy with problems’ but others as ‘degraded’ (Poirier and De Loe 2011). On the other hand, the Red Deer River sub-basin, with less irrigation, is hydrologically the healthiest in the SSRB (GoA 2006).

Allocating water for environmental purposes would result in immediate benefits for these stressed aquatic ecosystems (Poirier and De Loe 2011), however cultural and political factors make it a difficult initiative to implement. Irrigators have fought with drought and the semi-arid nature of southern Alberta to provide their livelihoods over the last 100 years so they have a historical connection to their water use and are not willing to give it up (Poirier and De Loe 2011). With no support, politicians are unable and unwilling to change the ‘first-in-time, first-in-right’ (FIT-FIR) water allocation system that gives priority to senior water license holders over junior or environmental allocations. The 1999 Water Act added a water market to FIT-FIR so license holders can sell their allocations temporarily or permanently to encourage efficient water use and the government can hold back 10 percent of the traded water for conservation purposes, but because it has seen little use (Bjornlund 2010), efforts to protect aquatic and riparian ecosystems need to be made in other ways. To attain healthy ecosystems and work around FIT-FIR, the GoA must focus more on water quality issues instead of water quantity. With the WFL and LUF, the GoA is calling for the use of MBIs to give private landowners incentive to increase ES provision on their land, increasing the quality of source water and ecosystems around it.

## **2.2 MBIs and ES in Environmental Policy**

MBIs and ES are two complementary concepts that have increasingly been incorporated into environmental policy over the last four decades. The concept of ES began in the late 70s as an educational tool to increase the interest in biodiversity conservation by illustrating the utilitarian benefits of ecosystem functions to society, and by the 90s the concept was becoming more mainstream (Gomez-Baggethun et al. 2010). At this time, Costanza et al. (1997) broadened the interest in the topic by actually estimating the economic value of ES. After the Millennium Ecosystem Assessment in 2003, ES found a secure spot in the environmental policy agenda around the world, and presently they are influencing economic decisions through the increased use of MBIs (Gomez-Baggethun et al. 2010).

Economists have also been promoting MBIs as environmental policy tools since the 70s (Hahn and Stavins 1991), but with most of the environmental focus being on emissions at the time, environmental groups opposed their use. Tradable permits were equated to “licences” or “rights” to pollute and given the flexible nature of MBIs these groups perceived that they would lead to less pollution control (Hockenstein et al. 1997, Hahn 2000). However, the 90s showed an increase in MBI use by policy makers, especially in the US, due to the success of the 1990 amendment to the US Clean Air Act for the SO<sub>2</sub> Allowance Trading System (Henderson and Norris 2008). This system of tradable permits proved on a large scale that MBIs were able to achieve cost minimization for the industries involved while also generating environmental improvements that went further than what the CAC approaches could have produced (Stavins 1998). Innovative methods to keep abatement costs low were developed to

capitalizing on the heterogeneities in different firms' abilities to reduce emissions, thereby creating competition that reduced emissions further than mandated level, allowing them to be banked for future use (Colby 2000). These benefits from flexibility are also advocated in other kinds of MBIs (Hahn and Stavins 1992, Jaffe 2001), which allow MBIs to be used in policy for other environmental issues such as encouraging landowners to manage their land and water for ES provision.

The ability of MBIs to provide similar results to command and control regulation, while allowing more flexibility and potential cost savings has made it become prominent in recent environmental policy in Alberta. Additionally, voluntary MBIs are politically more achievable in southern Alberta than command and control regulation for ecosystem protection; as is the case in North America (Johnston and Fraser 2006). This has been illustrated through the introduction of water sharing markets to encourage more efficient use of water, rather than changing the FIT-FIR allocation system. Irrigation representatives in Alberta have walked out of past meetings when the topic of removing FIT-FIR have been brought up (Poirier and De Loe 2011), so voluntary programs are easier for policy makers to put through. There are a few examples of MBIs that are already in use in Alberta, such as the water market, and others like conservation easements, carbon offsets, small NO<sub>x</sub>/SO<sub>x</sub> emissions trading programs for the electricity sector, deposit-refund schemes, and a carbon charge on large final emitters (GoA 2010). It has also been noted that more coercive voluntary methods, like MBIs, have higher rates of adoption than other more passive or educational voluntary programs (Johnston 2006). The GoA has outlined in its major land and water strategies development of MBIs to entice ES provisions and protect ecosystems and source water.

### **2.2.1 Current Alberta Legislation and Policy**

After a multi-year drought at the turn of the millennium, the GoA started a public consultation process about the future of the province's limited water resources, creating the Water For Life Strategy (WFL) in 2003 (GoA 2008a), which fulfilled the requirement in the Water Act to develop a provincial water strategy. The WFL's three goals are (1) to provide safe, secure drinking water supplies for all Albertans, (2) to ensure healthy aquatic ecosystems, and (3) to provide reliable, quality water supplies for a sustainable economy (GoA 2003a). All three of these goals add to Albertans' quality of life but healthy aquatic ecosystems are preconditions for securing the quality water needed for the other goals. In the 2008 renewal of the WFL strategy, the use of MBIs are briefly mentioned for maintaining flexible and adaptive water management (GoA 2008a) but the 2009 WFL Action Plan lists the development of MBIs for ES as one of the three key actions for water conservation in the province (GoA 2009).

The year 2008 also saw plans to develop MBIs for ES within the Land Use Framework (LUF), which established seven regions and called for the development of land-use plans for each region, including the South Saskatchewan Regional Plan, to integrate land, water and environmental resource planning within the regions. The LUF sets out to achieve Alberta's long-term economic, environmental and social goals through finding new approaches to managing the province's land and natural resources, including water. For land stewardship and conservation on private lands, the LUF emphasises the use of more flexible MBIs where appropriate, while on public lands more traditional regulatory mechanisms will be employed (GoA 2008). The legal basis of this regional

land-use planning was established through the Alberta Land Stewardship Act (ALSA) in 2009 (GoA 2014b).

Both the LUF and WFL overlap with the GoA's desire to use MBIs to promote the provision of ES to protect ecosystem health and water quality. The ES will provide economic, social, and environmental benefits to Alberta, but to supply them the MBI must provide a suitable financial incentive to the landowners. To get a better grasp on what is suitable, policy makers should know the landowners' willingness to participate and what influences their willingness. The remaining sections of this chapter explain how core beliefs influence actions and the willingness to perform them.

### **2.3 The Value–Attitude–Behaviour Hierarchy and their Interaction**

The value-attitude-behaviour hierarchy is a way to describe a system of beliefs that influences behaviour. Beliefs are basic ideas about what a person can think to be true or false (descriptive beliefs), good or bad (evaluative beliefs), or what should or should not happen (prescriptive beliefs) (Rokeach 1968). Beliefs are the guides to action. Through an organization of many beliefs, or a 'belief system', a person forms implicit expectations of how the world works (Scheibe, 1970). The value–attitude–behaviour hierarchy illustrates the system of beliefs where the influence of beliefs flows from general values to more specific attitudes, and finally to the behaviour that is a result of these beliefs (Homer and Kahle 1988). Values are core beliefs that all other beliefs are based on, and attitudes are formed by many beliefs around a specific object or situation (Rokeach 1968). This leads to a relationship where behaviour is indirectly influenced by values

through a direct relationship with attitudes (Bamberg 2003, de Groot and Steg 2007a). Both values and attitudes are expanded upon in the following sections.

Although beliefs are the expectations of how the world works, experiences with the real world are often imperfect and incomplete, and therefore the beliefs are predictive and identified in probabilistic terms (Scheibe 1970). These probabilistic beliefs are also paired with the confidence a person has in them (i.e., the range or accuracy of the probability) (Scheibe 1970). In the section on the TPB, this concept is expanded on further through Fishbein and Ajzen's (1975) expectancy-value model, where the expectancy relates to probabilistic beliefs and the 'value', in this case, is the paired confidence of those beliefs.

### **2.3.1 Values**

In everyday language, the word 'value' is used in a number of ways: what something is worth, opinions of that worth, and moral principles (Dietz et al 2005). The first value refers to the usefulness or importance of a thing and is thus akin to 'utility' in economics. The second value looks at our assessment of worth or why we like the things we do. It expands from the simplicity of market figures to complex 'intrinsic values' that evade market pricing and have troubled economists trying to place dollar signs on them for decades. Where the first two values can be focused on specific things, the third value of moral principles is more general, suggesting standards for various states of the world and our actions. In economic and rational actor models, this type of value usually is not accounted for and behaviours are the result of thoughtful decisions about preferences that maximize foreseeable utility. However, as Dietz et al. (2005) explains, to resolve the

conflict between differing preferences, it is the values that tell us which are better by invoking moral considerations. Thus, “values are about what is desirable, whereas preferences are only about what is desired” (Dietz et al. 2005, p. 341). It is this third use of value that is associated with the value-attitude-behaviour hierarchy and this is the one focused on in this research.

Four characteristics set values apart from other beliefs: 1) values are the most central component of a person’s belief system and they are very stable over the person’s lifetime (Rokeach 1968, Bem 1970). The resistance to change a person’s values has been supported by linking the values to where and how the person was socialized (Lowe and Pinhey 1982), illustrating that they change little from their formation; 2) although being single and stable beliefs, values are linked to many other beliefs and are used as standards that attitudes are based on and on which behaviour is evaluated (Homer and Kahle 1988). Values represent a person’s beliefs about ideal modes of conduct and end goals (Rokeach 1968); 3) values transcend objects and situations, and consequently are not limited to one issue (Rokeach 1968, Schwartz 1992). This ties in with the second point since values are not limited to specific situations, they can be the base of many other beliefs. Finally, 4) the number of values is limited to only a few dozen because of a value’s encompassing nature. This is in contrast to the thousands of beliefs and attitudes a person can have (Schwartz 1992, Rokeach 1968, Dietz et al. 2005).

Values are ordered in a system of priorities but many values often transcend the same situations (Rokeach 1968, Schwartz and Bilsky 1987, Schwartz 1992). As a result values can often work together or in competition with one another. Because of this, an individual’s values are organized into a hierarchy of importance that can change at

different times and under different circumstances (Homer and Kahle 1988). Those on top at any given time or circumstance will be most influential to a given situation (Rokeach 1968, Schwartz and Bilsky 1987, Schwartz 1992). While many individuals can hold the same set of values, the relative importance of the values differs from person to person, but different hierarchies of values that are similar enough can be generalized as the same 'value orientation'. Studying VOs can provide a link between the interaction of important values in a situation and the attitudes developed around that situation (Vaske and Donnelly 1999).

### **2.3.2 Value Orientation**

In the literature on environmental behaviour, VOs have been useful tools to summarize the hierarchy of people's values that influence their decisions and behaviour. The structure of VOs allows one to relate the systems of value priorities, as an integrated whole, to other variables (Schwartz 1994). Scheibe (1970) outlined a spectrum of value types one may hold, although many values are not applicable to every situation and some may work together while others are opposed. In a survey to identify a universal value system, Schwartz (1992; 1994) proposed 56 values that respondents would rate the importance of in their life. Ten motivational types of values emerged, which were then plotted on a two-dimensional space that would comprise four separate clusters. The first dimension reflects the openness to change versus conservatism, and the second dimension reflects the social or self-transcendent values versus personal interests or self-enhancement. The second dimension has been shown in research to be especially related

to environmental behaviour (de Groot and Steg 2008) and it is identified as two VOs: egoism and altruism.

Other researchers have organised people's VOs into a biocentric/anthropocentric continuum when related to environmental issues, such as wilderness preservation (Vaske and Donnelly 1999). Vaske and Donnelly are able to empirically show that their VOs were able to predict people's attitudes towards wilderness preservation, and that the attitudes mediated the relationship between VOs and behavioural intentions through a structural equation path analysis. Although older research was not able to confirm it (Stern and Dietz 1994), in more recent literature a further distinction of major VOs has been made by dividing the altruistic VO into two unique groups to make a total of three VOs that are important to environmental behaviour: humanistic altruism; biospheric altruism; and egoism (de Groot and Steg 2007, de Groot and Steg 2008, Dietz et al. 2005). The split in the altruistic values comes from the acknowledgement of intrinsic value of the environment. The human altruistic value orientation is similar to the self-interest orientation because they are both anthropocentric and only give the environment an instrumental value, where biospheric altruism shows concern for species and environments above that of human use (Dietz et al. 2005).

Narrowing the broad topic of general environmental behaviour and ethics to that of the behaviour and decisions of farmers and landowners in relation to their landholdings, similar, yet more specific VOs have been identified. From their review of the sociological and psychological literature on the values farmers may have for their landholdings, Maybery et al. (2005) identified three common VOs: economic, conservation, and lifestyle. They were able to successfully identify separate groups of Australian farmers

based on these VOs. The behaviour of farmers with an economic VO is motivated strongly by business and profits and thus would be more akin to the egoistic VO in the broader environmental behaviour literature. Farmers with the lifestyle VO were motivated by family and community, and thus they had more ties with the humanistic altruism VO. Finally, the farmers with the conservation VO, who were concerned with environmental stewardship, were analogous with the biospheric VO.

A similar approach was taken by Kuehne et al (2008) to differentiate rural irrigators in Australia based on their values towards the water allocation reform that aimed to provide more water for the environment. The study focused more on the values around family, profit, and buying or selling land and water than environmental values. The VO groups identified in their study were: investors (25%), who were profit-oriented; providers (50%), who tended to be opposite from investors but generally family succession oriented, and; lifestylers (25%), who were somewhere in between the other two groups on most values. Although a VO related to the biospheric or conservation orientations did not surface in the study, it is easy to see that the investors VO group is related to egoism and the providers VO group more to altruism.

In this study, the typology of VOs similar to those identified by Maybery and his colleagues was adopted. Both Maybery et al (2005) and Kuehne et al. (2008) claimed that grouping landowners into different VOs will help to understand their motivations and may allow policy makers to make informed policies. Treating landowners as a whole may make it difficult to identify important values that motivate one particular landowner group. Schultz and Zelezny (2003) argued similarly that it is necessary to frame environmental messages according to the salient values of a culture. For example, people

with strong egoistic and economic values could be targeted with messages about increased property value or farm productivity associated with the adoption of some environmentally beneficial land practices. The more altruistic groups (lifestyle and environmental) could be targeted with messages about helping other people or protecting the environment.

Values and VOs, however, are broad strokes when it comes to examining particular behavioural choices. Values are stable and cannot explain details about specific behaviour. VOs have a greater connection to behaviour as they illustrate the interaction of different values for specific situations. However, according to the value–attitude–behaviour hierarchy, the cognitive beliefs that directly influence behaviour are the attitudes people form about specific situations. The following section therefore defines attitudes and how they are formed.

### **2.3.3 Attitudes**

An attitude, as Rokeach (1968, p. 112) defines it, is “a relatively enduring organization of beliefs around an object or situation predisposing one to respond in some preferential manner.” The objects and situations may be physical or social, concrete or abstract (Rokeach 1968). The attitudes are all evaluations of something quite specific, ranging from positive to negative. As a result, a person may have a multitude of attitudes depending upon objects or situations (Dietz et al. 2005). In other words, a person forms an attitude around every object or situation they come across in life. In terms of ES provision, different landowners are likely to have different attitudes towards providing ES on their land. Adding MBIs in order to influence the landowners into providing ES

on their land is another factor that will shape their attitude towards the act. There is a balancing act inside the mind of each landowner between his or her relevant beliefs to form an attitude that is either for, against, or indifferent to the object or situation, and thus shaping their behaviour.

Although attitudes predispose behaviours, values are essential in forming peoples' attitudes. Values provide the base from which the beliefs that form attitudes stem; therefore the attitudes correspond with the most important values in VOs. For example, a positive attitude towards protecting ES would likely be shaped by an underlying value of environmental protection and a biospheric VO. In addition, while values are quite consistent over time, attitudes are less consistent (Rokeach 1968). The introduction of different external factors influences the importance of values in VOs and therefore the attitudes are likely to change. Further discussion on attitudes and how they are formed is found in section 2.3.1, relating to the TPB. In the next section, the influence of socio-demographic and external factors on behaviour is expanded upon.

## **2.4 Socio-Demographic and External Factors**

Socio-demographic, property characteristics and other situational characteristics of the landowners may also help to explain their ES provision choices. Studies of environmental concern and behaviour in the 1970s and 1980s used attitudes and values as the principle variables for explanation and prediction (Corraliza and Berenguer 2000); however, their predictive capabilities were found to be limited. Corraliza and Berenguer (2000) state that this was because the levels of measurement used in these studies were often too general, abstract and hypothetical in nature to relate to the research topics while

little importance was given to variables of a situational nature. In the 1990s the focus of predictive variables shifted to situational factors expected to facilitate or inhibit responsible environmental behaviour. These situational factors were external to the person's beliefs and included variables measuring the social setting, such as norms, but also the characteristics of the physical setting and the people carrying out the environmental actions (Corraliza and Berenguer 2000). There are, however, many possible external factors and they differ from each situation, making them case specific. Knowler and Bradshaw (2007) reviewed situational factors of adoption of conservation agriculture by farmers in 31 different studies. They performed a synthesis of these studies and found that there were no universal predictors of farmers' behaviour among the variables identified by each study. Commonly used variables in studies of farm practices and the participation in government programs include wealth, age, sex, education, experience, land size, type of land uses, family involvement, succession planning, and political affiliation (Marshall 2004, Knowler and Bradshaw 2007, Konisky et al. 2008).

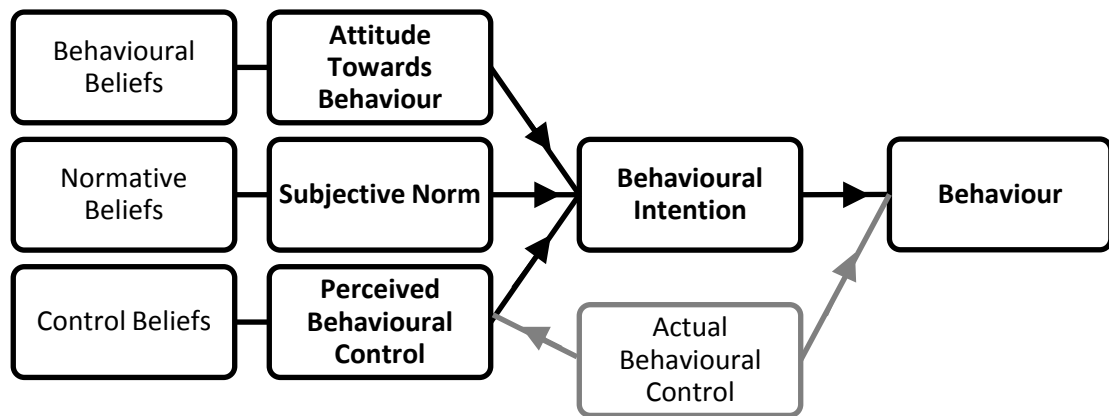
Corraliza and Berenguer (2000) argued that to improve the explanatory or predictive power of both internal (attitudes and values) and situational (socio-demographic and external) variables, they must be used in tandem and understood in relation to one another. They found that the predictive power of these internal factors were greatest when the influence of the situational factors were consistent with that of the person's attitudes, and they were smallest if in conflict, such as attitude supporting action but economic barriers preventing action. It is when both the internal and situational variables support an action, or a non-action, that it is likely to occur (Corraliza and Berenguer

2000). Therefore, understanding how situational variables and internal variables of values and attitudes influence behaviour is important to better predict whether a certain action or behaviour is likely to take place, such as the adoption of MBI for the provision of ES. Ajzen's (1991) Theory of Planned Behaviour is a model that incorporates both internal attitudes and situational factors to improve explanatory power and is explained in the following section.

## **2.5 Theory of Planned Behaviour**

Many of the problems with earlier models attempting to predict behaviour came from the exclusion of belief variables or situational factors. Additionally, the use of overly general values and attitudes such as environmental concern are too broad for successfully predicting behaviour for specific issues of interest, such as participation in specific MBI programs for ES provision. Ajzen's (1991) Theory of Planned Behaviour (TPB) is a model (figure 2.1) that attempts to resolve these faults since its situation-specific cognitive variables have direct influence on behaviour, while environmental concern has been shown to have a substantial effect on those TPB variables (Bamberg 2003). To explain one's intention to behave, a direct antecedent of actual behaviour, the TPB not only uses one's attitudes towards the behaviour as predictor, but it also incorporates social pressures and control factors that the person perceives to be important for the specific action and their ability to perform it (Ajzen 1991). These external situational factors are represented in the model by the person's internal beliefs about them and thus are called subjective norms and perceived behavioural control. Ajzen (2006) states that these three considerations, *attitudes toward the behaviour*, *subjective norms*, and

*perceived behavioural controls* are what guide human action, and they are created by aggregating a number of beliefs specific to the action. TPB has been heavily used in the prediction of health behaviour (Armitage and Conner 2001) but has recently been used to explain environmental behaviour, including water conservation (Trumbo and O'Keefe 2001, Lam 2006, Clark and Finley 2007) and landowners' decisions in riparian zone management (Beedell and Rehman 2000, Corbett 2002, Fielding et al. 2005). This section will explain the theory behind the TPB and its variables as well as some methodology used to capture and represent them.



**Figure 2.1: Theory of Planned Behaviour (Ajzen 1991)**

### **2.5.1 Attitude Towards the Behaviour**

When a landowner considers performing an action, their beliefs surrounding that behaviour are taken into account and an attitude is formed that may support, oppose, or be neutral towards the completion of the action. Ajzen's attitude toward behaviour is the variable in the TPB that attempts to capture this aspect of decision making (Figure 2.1). There are, however, many beliefs surrounding different behaviours and some of those beliefs may not be considered by all. Behavioural Beliefs (Figure 2.1) are the important

beliefs that make up the attitude. The Expectancy – Value Equation (Fishbein and Ajzen 1975) is employed to calculate the attitude towards the behaviour from these behavioural beliefs (equation 2.1). In the Expectancy – Value Equation (with ‘value’ used in a sense of numerical representation of strength), Schiebe’s (1970) probabilistic beliefs and the confidences of those beliefs can be seen as the behavioural belief strength ( $b$ ) and the outcome evaluation ( $e$ ), respectively. These behavioural beliefs ( $be$ ) are paired around a belief item ( $i$ ), and the products of each pair are summed to approximate the attitude towards the behaviour ( $A_B$ ).

$$A_B \propto \sum b_i e_i \quad (2.1)$$

The behavioural belief strength,  $b$ , identifies how strongly the person believes in or agrees with that belief item. In other words,  $b$  is the expectancy or how likely the person will think that belief to be true. In Rokeach’s (1968) terms it is a descriptive belief. The outcome evaluation,  $e$ , identifies the importance of the belief item and its consequences, giving it a value on a scale such as “good” or “bad”. For Rokeach (1968), this is an evaluative belief. A relevant belief item ( $i$ ) is the statement that ‘watering cattle away from a creek will protect water quality’. A person can first express how strongly they believe the statement to be true ( $b$ ) and then identify the degree to which they think the outcome is good/bad or important/unimportant ( $e$ ). As said before, however, attitudes are formed by many beliefs surrounding a behaviour so the Value – Expectancy Equation and TPB includes multiple pairs of behavioural beliefs. Another belief example surrounding the behavioural action of watering cattle away from a creek is the increased expenses needed to purchase watering equipment. Is this likely to happen or be an

important issue? The number of potential behavioural belief pairs, however, can be nearly limitless. So to enter them into a model, a system must be put in place.

Ajzen (1991) explains that using the most salient beliefs in regard to the behaviour are enough for approximation of the actual attitude. For different individuals, however, certain beliefs may be more important than others, making it difficult to compare the effect of their attitude upon their behaviour. To compensate for this Ajzen (2006) suggests identifying the modal beliefs the study population holds through preliminary investigation. As a result, the attitudes are simplified for easier computation and comparison by using fewer beliefs that are more relevant to the study population as a whole. With the salient beliefs identified, statements can be formed to elicit responses in a questionnaire format. The questionnaire statements are answered on a rating scale, usually from 1 to 7, with opposing terms on opposite ends such as “strongly disagree” and “strongly agree” for the behavioural belief strengths ( $b$ ) and “very bad” and “very good” for outcome evaluation ( $e$ ). The resulting response numbers are then entered into the equation to form the behavioural beliefs ( $be$ ) and attitude towards the behaviour ( $A_B$ ). Further discussion on the questionnaire and variable calculation employed in this study is laid out in the Research Design and Methods Chapter.

### **2.5.2 Subjective Norm**

In addition to a person’s own attitudes towards a behaviour, the attitudes of other people and groups will influence that person’s choices and behaviour through the social pressures of norms. The TPB represents these norms with the person’s internal beliefs about them and are called subjective norms. Like the attitude toward the behaviour,

which is formed by multiple beliefs, subjective norms are formed by the beliefs about what many different groups might think about the behaviour. Similar to the different beliefs that create an attitude that people find important, different referents (i.e. influential people and groups), which build the subjective norm, are considered more or less important from person to person. Therefore the same approach is taken to find the salient modal referents through preliminary study (Ajzen 1991, Ajzen 2006).

Using the same formula as the Expectancy – Value Model, subjective norms can be calculated from survey questions that identify two types of beliefs about each modal referent. These beliefs are the normative expectations of others, called the normative belief strength (i.e. how strongly the person feels the referent would approve or disapprove of the behaviour), and the motivation to comply with that referent’s expectations of them. These two beliefs then interact to form the normative belief about the referent. The expectancy – value formula for the subjective norms can then be illustrated in equation 2.2:

$$SN \propto \sum n_i m_i \quad (2.2)$$

where the normative beliefs ( $nm$ ) are the products of the normative belief strength ( $n$ ) and motivation to comply ( $m$ ) to their respective referents ( $i$ ), and are then summed together to approximate the Subjective Norm ( $SN$ ). The questionnaire statements for normative belief strength ask the respondent how supportive they think certain referents would be of performing a certain activity, answered on a 1 to 7 scale. The level of motivation to comply with what that referent thinks is also answered on a 1 to 7 scale. These scales can be found in the methods chapter.

### **2.5.3 Perceived Behavioural Control**

The final factor that Ajzen (1991) includes in his TPB is the Perceived Behavioural Control (PBC). This factor is what distinguishes the TPB from its predecessor, the Theory of Reasoned Action (TRA) by Fishbein and Ajzen (1975). The factors in the TRA include only the attitude towards the behaviour and subjective norms, where the TPB recognises that there are actual physical and systematic barriers that may prevent or promote certain behaviour despite what the person's attitude or the social norms dictate should be done. As shown in figure 2.1, intentions to behave as well as Actual Behavioural Controls are what influence actual behaviour. However, much like actual behaviour, Actual Behavioural Control is often hard to measure and incorporate into a simple formula. However, the perceived beliefs about Actual Behavioural Controls will have an effect on one's intention to behave. If someone believes there will be road blocks inhibiting a certain behaviour and that these blocks will be powerful, the person will be less likely to intend to do it. So it is this Perceived Behavioural Control (PBC) that influences intention to behave.

The PBC, like the other two factors in TPB, use the expectancy – value formula to compute the internal beliefs about what might have control over the behaviour. A questionnaire can address the two beliefs from the formula that creates the PBC by asking about the expectancy that something will inhibit or facilitate the behaviour (behavioural control strength) and how powerful they think that control would influence their actual behaviour (behavioural control power). Also like the other two factors in the TPB, preliminary investigation can be used to find the salient behavioural control beliefs. The

salient belief items are then added into the converted expectancy – value formula for PBC shown in equation 2.3;

$$PBC \propto \sum c_i p_i \quad (2.3)$$

where the control beliefs ( $cp$ ) are the products of behavioural control strength ( $c$ ) and behavioural control power ( $p$ ) for their respective salient control beliefs items ( $i$ ), and are summed together to form an approximation of PBC. The wording of the questionnaire statements and scales used for answering are found in the methods chapter.

#### 2.5.4 Behavioural Intention

As mentioned above, the information on actual behaviour is sometimes difficult to acquire. When dealing with prediction of behaviour where the behaviour has yet to be completed, researchers must rely on the antecedent of actual behaviour: behavioural intention. Through the TPB, behavioural intention can be calculated by summing together equations 2.1, 2.2, and 2.3 of the model's three variable into equation 2.4, which simplifies to equation 2.5:

$$B \propto BI = \sum b_i e_i + \sum n_i m_i + \sum c_i p_i \quad (2.4)$$

$$B \propto BI = A_B + SN + PBC \quad (2.5)$$

where Behavioural Intention ( $BI$ ) is equal to the sum of the Attitude towards the Behaviour ( $A_B$ ), Subjective Norms ( $SN$ ), and Perceived Behavioural Control ( $PBC$ ).

Without access to actual Behaviour ( $B$ ),  $BI$  can then be used as a proxy. The TPB has been shown to predict behavioural intention better than actual behaviour. In a meta-analysis of the TPB, the model accounted for 12% more variance explained for

behavioural intention than actual behaviour, with  $R^2$  values of 39% and 27% respectively (Armitage and Conner 2001).

### **2.5.5 Additional Variables**

With the TPB being an expansion of the TRA, Ajzen (1991) states that it is open to further expansion if the variables can be proven to fit empirically and theoretically. Researchers have been able to add additional variables beyond the three core variables of the TPB, providing increased explanation of variance in their studies. The inclusion of past behaviour, moral obligation (Ajzen 1991, Conner and Armitage 1998), and self-efficacy (Conner and Armitage 1998, Corbett 2002) to the TPB is a common practice, as these additional variables tend to capture a significant amount of variance in the intention to behave or the actual behaviour itself. Although past behaviour does not cause future behaviour, people may have had similar experiences in the past or have formed a behavioural habit, which makes their decision making simpler and less reliant on the other TPB variables (Ajzen 1991, Conner and Armitage 1998). Fielding et al. (2005) found past behaviour, with a positive coefficient, to be the most important predictor of landowners' intentions to participate in riparian land management using a TPB model. However, past behaviour had a negative coefficient when explaining riparian protection in the study by Corbett et al. (2002) using the TPB. The negative effect of past riparian protection on the intention to participate in future protection was speculated to be the result of landowners thinking no further protection was needed on their part.

Moral obligation, or moral norms, considers the personal feelings of moral responsibility, in addition to the social pressures of the subjective norms and attitudes

about the behaviour, to perform or refuse to perform a certain behaviour (Ajzen 1991). The moral obligation relates to one's self-identity; behaving, or intending to behave, against that identity would be unlikely as it creates internal conflicts (Conner and Armitage 1998). Finally, self-efficacy as described by Corbett (2002) is the belief that one's actions make a difference on the overall environmental quality. Generally, people intend to engage in behaviours if they possess self-efficacy or feel they will make a difference, which is theoretically different from the internal or external constraints or facilitators of PBC that effect one's ability to perform a task (Conner and Armitage 1998).

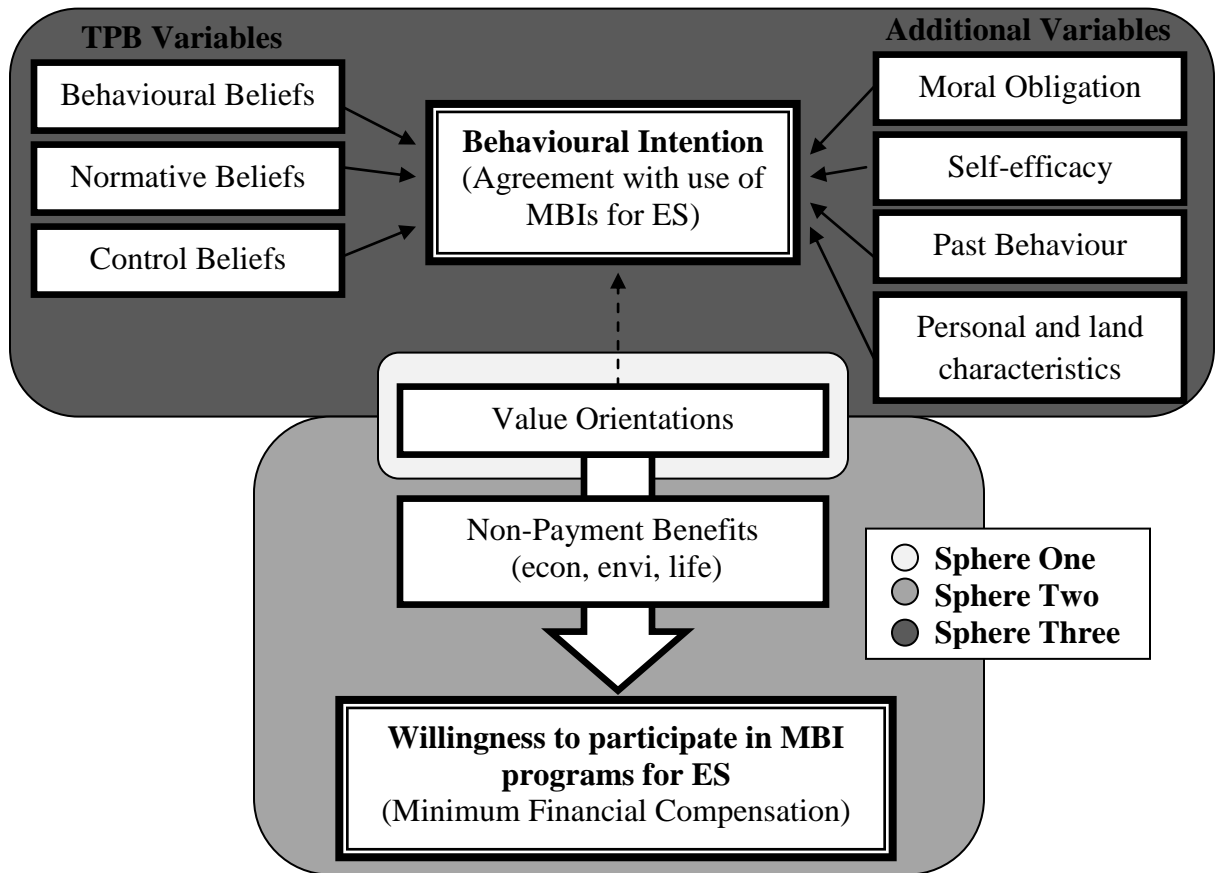
## **2.6 Conceptual Framework**

The concepts of value orientations, beliefs, and the TPB discussed above were integrated into a conceptual framework to provide a guide for this research to understand landowners' willingness to participate in MBI programs for ES provision. Included in the framework are the three spheres of investigation: 1) landowner value orientations, 2) the effect of VOs and non-payment benefits on the landowners' willingness to participate in MBI programs for ES provision, and 3) factors affecting the landowners' agreement with the use of these programs (Figure 2.2).

In the first sphere, landowners are organised into VO groups based on the values Maybery et al. (2005) proposed as the most important in farmers' land management decisions. With values, and therefore VOs, influencing all beliefs and actions lower in the value-attitude-behaviour hierarchy, Sphere One is shown to overlap with the other two spheres of investigation. The VOs are an integral part of the second sphere as they are identified to see how they influence landowners' willingness to participate (measured in

the landowners' minimum financial compensation required to participate) in a MBI program providing financial incentives for ES provision. Furthermore, it is hypothesized that non-payment benefits from participating in the MBI programs, which help provide the ideal end goals environmental, economic, and lifestyle values aim to achieve, will also affect the landowners' willingness to participate in the programs. Finally, the arrow running from the VOs through the non-payment benefits shows that the willingness of the landowners should differ depending on which non-payment benefit is provided, based on the VO group the landowners belong to.

The third sphere is also influenced by the VOs, but because of the relationship between values and attitude, the attitudes are assumed to have a more direct influence on behavioural intention, so the VOs are shown to have an indirect influence with a dashed arrow. This section of the model is an adapted version of the TPB, where behavioural, normative, and control beliefs, as well as the additional variables of moral obligation, self-efficacy, past behaviour and personal and land characteristics can be used to predict one's behavioural intention. In this case, behavioural intention is identified with the landowner's agreement with the use of MBIs to increase ES provision for the protection of water quality.



**Figure 2.2: Adapted TPB for the agreement with the use of MBIs and the willingness of landowners in different value orientation groups to supply ES affected by different incentives**

## 2.7 Summary

The purpose of this chapter was two-fold: first to provide context of water and environmental issues occurring in southern Alberta, and how MBIs for ES provision may help alleviate them; and second, to discuss how landowners' decisions are governed by their values and attitudes. Southern Alberta, by nature, has a limited water supply but irrigation has helped to make agriculture a prosperous business in the region. Non-point source pollution from these agricultural activities and over allocation of the water resources puts aquatic and riparian ecosystems at risk of further environmental degradation. MBIs have been shown to produce similar results as command and control

environmental policies while allowing flexibility for the participants to achieve the goals in a cost efficient manner. The voluntary approach of MBIs is more politically viable in Alberta, so the WFL and LUF aim to utilise them to provide the ES the province needs and to protect water quality and ecosystems health. Whether the landowners support the use of these MBIs and plan to participate in them requires looking into what drives their actions.

The second area of discussion in this chapter was how landowners' willingness to participate in MBI programs for ecosystem service provision is shaped by a system of beliefs that guide decision making processes. Behaviour is directly influenced by one's attitude towards it, and indirectly influenced by the person's values, which are what form attitudes. This relationship is known as the Value-Attitude-Behaviour Hierarchy. Within this hierarchy also fits value orientations between values and attitudes. Value orientations are simplifications of the interactions of values for certain situations. Identifying groups of landowners by their value orientation will help in tailoring MBIs that reflect their values and thereby make them more willing to participate, but examining their attitudes will help in the understanding of their detailed behaviour when it comes to participating in such a program. The TPB explains specific behaviour through examining the attitudes towards the behaviour, beliefs about social norms, and physical and systematic controls on performing the behaviour. Additional variables such as past behaviour, moral obligation, self-efficacy, and socio-demographic variables also can be added to the TPB in order to increase its explanatory power.

## *CHAPTER THREE*

### **3 RESEARCH DESIGN AND METHODS**

This chapter discusses the approaches used to acquire and analyze data pertaining to the willingness of rural landowners to provide ecosystem services, within the context of the WFL goals, assuming the aid of market-based instruments in southern Alberta. A description of the study area is provided, then the chapter discusses the process of data collection and questionnaire development. Finally it concludes with a description of the methods used to analyse the data.

#### **3.1 Study Area**

This section provides a brief overview of the geography of southern Alberta, with a focus on the Oldman River Basin (ORB) in which the study area of the Municipal District of Willow Creek and the County of Lethbridge are located (Figure 3.1). Much of southern Alberta is classified as having a semi-arid climate. The region is largely situated in the South Saskatchewan River Basin (SSRB), which has a mean annual precipitation ranging from 476 mm per year in Banff to 335 mm per year in Medicine Hat (AMEC 2009). Irrigation networks were developed in the early 20<sup>th</sup> century to provide the agricultural lands with water from rivers that are supplied mostly from snow melt in the eastern slopes of the Rocky Mountains (GoA 2000).

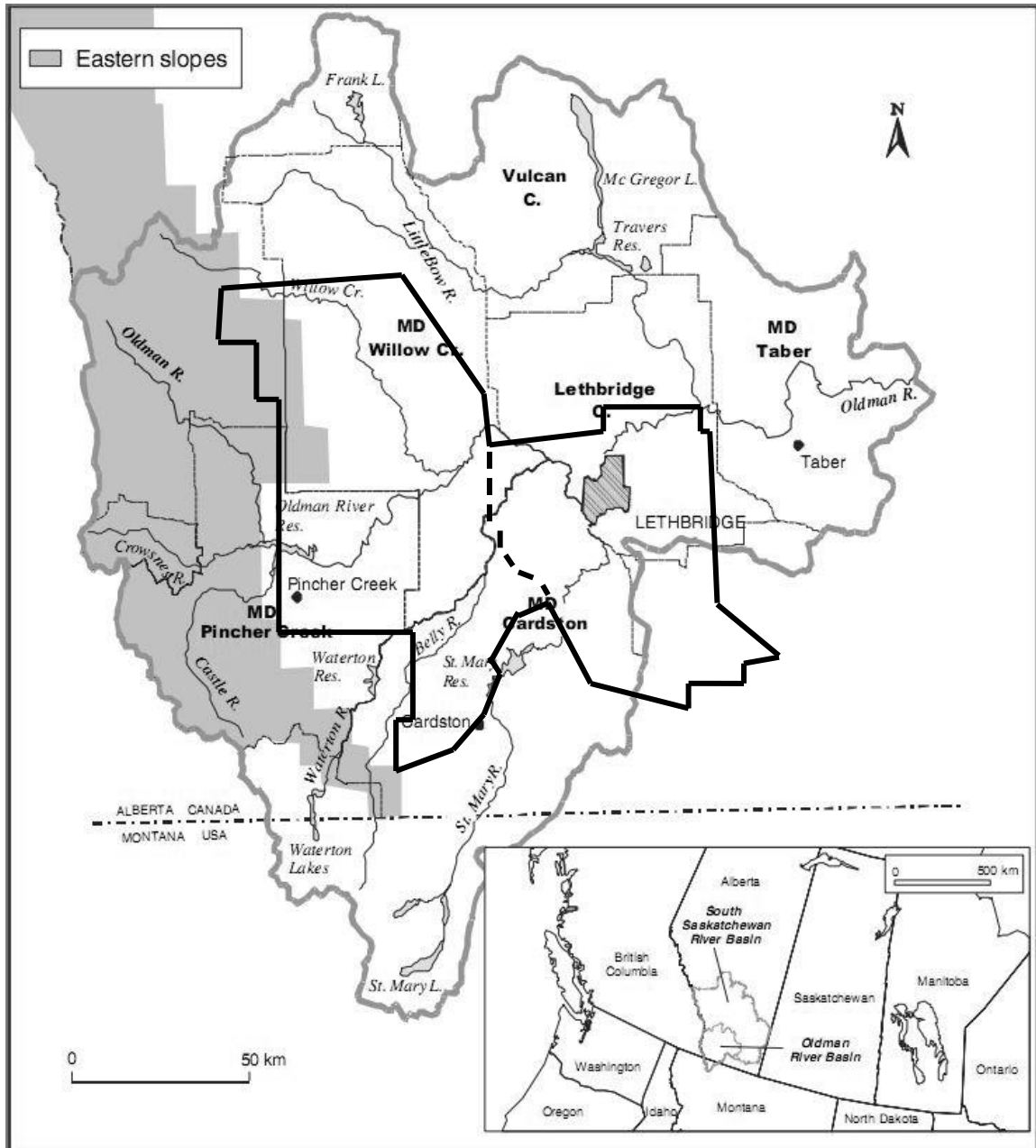
The ORB is a sub-basin of the SSRB and it makes up the south western corner of the province with part of its head waters coming in from Montana. The basin covers a total area of about 28,000 km<sup>2</sup>. It is home to over 160,000 people living on farms, within 20 settlements under 10,000 people, and in the City of Lethbridge, which contains about half

of the basin's population (Ivey et al. 2006). Within the basin, human activity includes forestry, recreation, and oil and gas developments in the western portion, while agriculture dominates the middle to eastern portion of the basin. Overall, about one third of the land cover is agricultural, but excluding the headwaters in the eastern slopes, agriculture represents over 50% of the land use cover (Rock and Mayer 2006). The vast majority of licensed water in the basin (88%) goes to agriculture, with 87% of that licensed water allocated to the irrigated 32% of the cropland (Rock and Mayer 2006). Additionally, the ORB accounts for a large amount of Alberta's intensive livestock operations, with about 75% of the province's beef for slaughter (Rock and Mayer 2006).

The study area for this research, however, is only a section of the ORB. It includes the Municipal District of Willow Creek (MDWC) and the County of Lethbridge (COL), which are two neighbouring districts that lie almost entirely within the ORB (Figure 3.1). The combination of both districts allows for a good representation of the different land uses in the ORB. The COL contains parts of the St. Mary and Lethbridge Northern irrigation districts, which contain intensive cropland and some of the highest concentrations of intensive livestock operations in the country (Little 2003). On the other hand, the MDWC contains private irrigation, less intensive dryland farming, and larger ranches as the MD enters the foothill to the west. According to the 2006 Census, the MDWC and the COL combined had 4538 private residential dwellings (GoA 2010a, GoA 2010b). This number can then be used as a proxy for potential number of rural landowners. Within both the MDWC and the COL there have been a number of studies on water quality within the watersheds of the ORB (Miller et al. 2009, Koning et al.

2006, Hyland et al. 2003, Rock and Mayer 2004, Rock and Mayer 2006, Rodvang et al. 2004, Lorenz 2008), so the water quality is a well-known concern in both districts.

In the Oldman River and its tributaries, water quality monitoring has shown total phosphorous and total nitrogen concentrations, and levels of fecal coliforms that are occasionally in excess of the Alberta Surface Water Quality Guidelines (Saffran 2005). In the eastern parts a number of artificial canals dispose drainage water into the tributaries. They are therefore affected heavily by intensive agriculture and exceed the guidelines more often and to a higher degree than the main river (Saffran 2005, GoA 2003b, Ivey et al. 2006). In general, the southern Albertan landscape has been greatly altered over the last century as a result of the expansion of irrigation and intensive livestock. Therefore, there is a pressing need to design water quality improvement policies in order to prevent further deterioration of water quality in this intensive agricultural region. Furthermore, it is important to know how landowners will react to policies that implement MBIs for ES provision.



**Figure 3.1: Map of Oldman River Basin, Municipal District of Willow Creek and Lethbridge County. Modified from Ivey et al. (2006)**

### **3.2 Data Collection**

The primary data was collected with a questionnaire conducted through computer-assisted phone interviews with the landowners. Preliminary semi-structured, personal interviews with local landowners were conducted beforehand to inform the development of the questionnaire and uncover local insights. The participants in these personal interviews were recruited by contacting the local municipal district offices, the Battersea Drain Watershed Group, local agricultural businesses, bed and breakfasts, and community clubs and organizations. In total, nine rural landowners agreed to participate as well as a rural extension specialist for one of the municipal districts. An attempt was made to vary the interviewees based on their land use, in order to uncover different opinions and issues. The types of these landowners included, either solely or in combination, of: beef, dairy, poultry, or pork producers; irrigated crop or dry land farmers; landowners who no longer farm but rent the land to other agricultural uses; a bed and breakfast owner, and; an acreage owner never directly tied to farming other than raising horses. Responses from these landowners, as well as the literature, helped inform the development process of the questionnaire script.

Advanis, a marketing research company in Edmonton, was hired to conduct the computer-assisted phone survey. Their professionally trained phone interviewers were provided with the questionnaire script and a list of 4845 potential rural landowners. Since no list of rural landowners could be obtained without offending privacy laws, postal codes servicing rural areas within the study area were identified and list brokers provided the phone numbers that corresponded to those postal codes. Many of the postal codes also serve towns and communities containing people who are not rural landowners,

so phone numbers linked to street addresses were removed from the list, but other non-rural residents with blank or P.O. Box addresses could not be removed. Therefore, screening questions to determine whether or not the respondents were rural landowners in the MDWC or COL, over 18 years of age, and the long term decision maker on the land were asked. The survey was conducted in November and December 2010 and all of the numbers were called at least once. In total, 1677 were found or assumed to be eligible households for the study and 350 full interviews questionnaires were completed, resulting in a 20.9% response rate.

### **3.3 Interviews and Questionnaires**

As stated before, preliminary, semi-structured interviews with nine rural landowners and one rural extension specialist were conducted in order to inform the questionnaire design. The first 12 questions of the preliminary interviews (Appendix I) were designed to discover information about the landowners, the land itself, and some of the landowner's attitudes and beliefs towards different policy options around environmental land management and ES. Question 10 linked the ES questions that followed to water issued by providing context of the WFL goals and how provision of ES are important to the supply of quality water needed to meet those goals. The last 12 questions about ES were used to create the TPB statements for the questionnaire.

Following Ajzen's method for forming TPB questionnaire statements (Ajzen 2006), Questions 13 to 21 were used to obtain lists of modal beliefs about: (i) what the landowners thought the advantages and disadvantages of supplying ES on their property are to identify behavioural beliefs; (ii) which individuals or groups would approve or

disapprove of supplying ES on their land to identify normative beliefs, and; (iii) what factors or circumstances would enable or make it difficult to supply ES on their land to identify control beliefs. The questions used to discover the above can be found in preliminary interview schedule (Appendix I) as questions 13 to 15, 16 to 18, and 19 to 21 respectively.

The questionnaire contained six sections: A) value statements; B) ES and policy preference statements; C) TPB statements; D) extended TPB statements; E) willingness to supply ES scenarios, and; F) personal and land characteristics (see Appendix II). The value statements of Section A come in two types: individual statements about economic, environmental, or lifestyle values and comparative statements pairing one type of value against the other. Nine individual value statements were adapted from Maybery et al. (2005) and (Kuehne 2008), with economic, environmental and lifestyle values being represented by three statements each (Table 3.1). Unlike the individual value statements where it's possible to answer the same for all value types, the comparative statements (Table 3.1) make the respondent think about trade-offs between two of the three value factors when they manage their land, resulting in a differentiation between the three main values. All of the value statements were answered on a seven point Likert scale of agreement, with 1 meaning strongly disagreeing, 7 strongly agree, and 4 neither agree nor disagree or no opinion. These statements were used in the first sphere of research to identify the value orientations (VO) of the landowners.

**Table 3.1: Value Statements**

<b>Category</b>	<b>Statement</b>	<b>Original</b>
Economic value	A maximum annual financial return from your property is your most important aim.	A maximum annual return from my property is my most important aim. (Maybery et al. 2005)
	Increasing the asset value or net worth of your land is very important to you.	Increasing the asset value or net worth of the farm is very important to me. (Kuehne 2008)
Environmental value	You view your land as first and foremost a business investment.	I view my farm as first and foremost a business enterprise. (Maybery et al. 2005)
	Managing environmental problems on your land is a high priority.	Managing environmental problems on my farm is a very high priority. (Maybery et al. 2005)
	Your right to do what you want with your property has to be balanced against wider environmental concerns.	My right to do what I want with my property has to be balanced against wider environmental concerns. (Kuehne 2008)
	The most important thing is leaving your property in better shape than you found it.	The most important thing is leaving my property in better shape that I found it. (Maybery et al. 2005)
Lifestyle value	The lifestyle that comes with living in a rural area is very important to you.	The lifestyle that comes with being on the farm is very important to me. (Maybery et al. 2005)
	For you, a rural environment is a better place to live than an urban environment. Rural communities are a great place to live and raise a family.	Farming communities are a great place to live. (Maybery et al. 2005) A rural environment is a great place to raise children. (Maybery et al. 2005)
Value comparison	When faced with decisions that affect the way you manage your land, economic factors tend to outweigh lifestyle considerations.	N/A
	When faced with decisions that affect the way you manage your land, economic factors tend to outweigh environmental concerns.	N/A
	When faced with decisions that affect the way you manage your land, environmental concerns tend to outweigh lifestyle considerations.	N/A
Responses:	1='strongly disagree', 2, 3, 4='neither agree nor disagree', 5, 6, 7='strongly agree'	

Section B of the survey instrument assesses what landowners think about ES, MBIs and general policy preferences. The statements use the same Likert scale as the previous value statements and most were attached to the questionnaire for purposes of another researcher. However, the introductory statements for the sub-sections did provide information and context needed for the remainder of the survey. In subsection B2, a broad definition of ES was provided as “[...] a term that collectively represents all the free

services humans receive from nature, including clean water and air, crops, wood, flood protection, soil regeneration, and aesthetic and recreational values.” Context within the County of Lethbridge and Municipal District of Willow Creek was then provided that poor water quality can reduce the provision of these ES, stressing the importance of the local water resources and the related ES. Furthermore, in subsection B3a, how MBIs use financial incentives and disincentives to promote or dissuade behaviour or land management techniques was explained, with examples of the types of mechanism used. Finally, in subsection B3b, the use of MBIs was put into a water quality protection and ES provision context and the landowners were asked to indicate their level of agreement with the statements:

- a) As fertilizer run-off contributes to water quality issues, market-based instruments should be used to provide incentives to change land management practices to reduce run-off.
- b) As buffer zones in specific areas can help limiting run-off and thereby improve water quality, market-based instruments should be used to provide incentives to install buffer zones.

The MBI in the first statement would provide incentive to adopt Beneficial Management Practices (BMPs) that would prevent the loss of ES from further reduced water quality, and in the second statement it would do so to adopt BMPs that increase ES provision to prevent water quality issues. Following Fielding et al. (2005), averaging the responses of these two statements together can create an index for the landowners’ general agreement with the use of MBIs for ES provision, which was used as the dependent variable in the third sphere of research. Although the remainder of the questionnaire was open to the interpretation of providing many types of ES, the context provided in this section was meant to bring ES provision for purposes water quality protection to the forefront of the respondents’ minds.

Section C comprises of the TPB statements based on the modal, or most common, beliefs from the landowners in the preliminary interviews following the method laid out in Ajzen (2006). These variables were used as independent variables in the third sphere of research. Subsection C1 contains the behavioural beliefs that form the Attitude Towards the Behaviour. Eight items were produced from the preliminary interviews to represent the common issues that affect one's attitude toward the behaviour of protecting ES on one's land: i) environmental quality, ii) limited resources, iii) pride in land management, iv) economic benefits, v) reduced competitiveness, vi) protecting future generations, vii) increased paperwork and red tape, and viii) benefits to society. To assess the behavioural belief strength (*b*), the respondents were asked to respond with the seven point Likert scale of agreement to statements using the items above such as, "It will help to improve environmental quality, such as habitat, or water and air quality". For outcome evaluations (*e*), the respondents were asked to rate, on a scale of one to seven, how desirable the items in the previous list would be as outcomes (e.g., "A healthy environment") of performing the behaviour in question.

Subsection C2 used a list of six modal referents to assess the normative beliefs that make up the Subjective Norms. The referents identified from the interviews were: i) family, ii) government, iii) people working in the environmental field, iv) neighbours and peers, v) recreational users of the land, and vi) members of the agricultural community and organizations. The normative belief strength (*n*) statements asked the respondents to agree or disagree to the referents thinking that making changes to the respondent's land management for the provision of ES would be a good idea, and the motivation to comply

(*m*) statements asked the respondent to express the degree to which they would want to comply with the referents.

Subsection C3 concludes the use of the modal beliefs supplied by the interviewees in the preliminary interviews. To assess the control beliefs that might have influence over whether or not the respondent could successfully conduct land management changes for the provision of ES, the five modal items were: i) not having a clear understanding of the total impacts of an action, ii) external economic forces, iii) the physical characteristics of the land, iv) the weather, and v) having time and money committed elsewhere. The two sets of statements assessing these factors are the control belief strength (*c*) and control belief power (*p*) statements, where the former asks for the agreement level to a claim that the factor is likely to be influential, and the latter asks about the added level of ease or difficulty the factor would present in making those land management changes.

Section D includes four statements that assess the additional explanatory variables often included with TPB studies referred to earlier in Chapter 2. Only one statement each for moral obligation and self-efficacy are used, however, past behaviour uses two. The first is to assess whether or not landowners have changed land management practices in the past on their own accord, and the other asks if they have participated in organized programs to change land management for environmental benefit. All statements use the seven point Likert scale of agreement for the responses. These statements were used as independent variables in the third sphere of research.

Section E contains four scenarios aimed at identifying the minimum financial compensation landowners would be willing to accept in order to participate in a MBI program for ES provision. The scenarios using different combinations of perceived

benefits from participating in a hypothetical MBI land management program to provide ES were: 1) environmental benefits only; 2) environmental and lifestyle benefits; 3) environmental and economic benefits, and; 4) a combination of all three perceived non-payment benefits. Since potential land management varies for different types of landowners, the hypothetical MBI program was ambiguous, allowing the landowner to imagine it relative to their land. The respondents were asked to imagine the financial burden they would expect to endure if they were to change their land management, and then to state the minimum financial compensation they would expect from a MBI in percentage of their personal costs from making the change (i.e., “No incentive or 0% of your cost covered”, “Some of your costs covered, so 50% or less but greater than 0%”, “Most of your costs covered, so greater than 50% but less than 100%”, “Full compensation, 100%”, “More than full compensation of your costs, so greater than 100%”, and “The threat of a fine”). These scenarios, as well as the values orientations derived from the statements in Section A, were used for the second sphere of research.

Section F includes the socio-demographic questions about the landowners and the descriptions of the land and operations conducted on it. The personal socio-demographic questions include: i) sex, ii) age, iii) marital status, iv) number of children, v) highest level of education, vi) year of education completion, vii) approximate household income, viii) place of upbringing (i.e., being raised urban or rural), and ix) political orientation. The land characteristics included: i) how much household income is derived from use of the land (in percentage terms), ii) number of acres owned, iii) primary uses of the land, iv) number of generations of family that has owned the land, and v) the landowner’s

expectation for farm succession (see Appendix II for response options). These variables were used in the first and third spheres.

### **3.4 Methods of Analysis**

The phone surveying company provided the responses to the questionnaire in a SPSS data set. The raw data was cleaned, inconsistencies were verified with audio files of the interviews, and responses were recoded into usable variables for the statistical analysis. The three spheres of investigation required different methods of statistical analysis. In the first sphere, cluster analysis was used to identify the VOs of the landowners. In the second sphere, crosstabs and ANOVA tests were used to discover the differences in landowners' willingness to participate in MBI programs for ES provision, according to their VO and the additional non-payment benefits gained. Finally, in the third sphere of research, regression analysis was undertaken to identify factors important to landowners' level of agreement to the use of MBIs for ES provision.

#### **3.4.1 Sphere One: Value Orientations**

The objective in the first sphere was to discover if landowners could be grouped based on the values that influence their land management decisions. The first hypothesis was that landowners do not have uniform values informing their land management and instead they can be organised into distinct VO groups. Using the three comparative value statements (A10, A11, and A12), multiple agglomerative hierarchical cluster analyses were performed with different seeding cases through randomizations of the order of cases in the data set, to produce multiple unique dendrograms. The common number of natural

clusters was then entered into K-means clustering to produce clusters with greater stability than those found by the agglomerative hierarchical clustering procedure.

ANOVA was used to test for a significant difference between the responses of the cluster groups to the three comparative value statements and the Tukey post hoc tests was used to determine if there were significant differences between each of the groups. The result from these tests as well as ANOVAs and Tukey tests conducted on the remaining nine value statements, representing economic, environmental, or lifestyle values, were used to label the VOs of each cluster group.

The second hypothesis was that members of the VO groups have different personal and land characteristics. This was tested using ANOVA and the Tukey tests on numerical variables to identify significant difference between the VO groups, and cross-tabulation and chi-square tests for nominal and ordinal variables. The variables tested are outlined in Table 3.2, which lists personal characteristics of the landowners, and in Table 3.3, which lists characteristics of the landholdings.

**Table 3.2: Personal Characteristics of Landowners**

<b>Variable</b>	<b>Descriptions</b>	<b>Analyses Values</b>
<i>Sex</i>	Sex of the respondent	0 = male 1 = female
<i>Age</i>	Respondent's age in years	Numerical
<i>Marital status</i>	Respondent's marital status:	1 = single and never married; 2 = legally married; 3 = common-law; 4 = separated; 5 = divorced; 6 = widowed Regression recoding: 0 = single (1, 4, 5, 6); 1 = coupled (2, 3)
<i>Children</i>	Number of children	Numerical
<i>Education</i>	Respondent's highest level of education	1 = No certificate, diploma or degree; 2 = Secondary (highschool) diploma or equivalency certificate; 3 = College or other non-university certificate diploma (including apprenticeship or trade); 4 = University Bachelor's degree; 5 = University Master's or Doctorate degree Regression recoding: 0 = non-university (1, 2, 3); 1 = university (4, 5)
<i>Experience</i>	Time since completion of education	Numerical
<i>Place of upbringing</i>	Rural or urban upbringing	0 = rural 1 = urban
<i>Political ideology</i>	Right, centre, or left leaning	1 = right; 2 = centre; 3 = left Regression recoding: right leaning as dummy variable
<i>Household income</i>	Approximate net annual household income in dollars	Numerical

**Table 3.3: Characteristics of Landholdings**

<b>Variable</b>	<b>Descriptions</b>	<b>Analyses Values</b>
<i>Income from land use</i>	Percentage of net income derived from land use	1 = 0% to 25%; 2 = 25% to 50%; 3 = 50% to 75%; 4 = 75% to 100% Regression recoding: 1 = 12.5; 2 = 37.5; 3 = 62.5; 4 = 87.5
<i>Land size</i>	Acres owned by respondent	Numerical (log transformed)
<i>Crop production</i>	A primary purpose of the land is for crop production	0 = none 1 = dryland farming, irrigation farming within an irrigation district, private irrigation farming, specialty crops, and/or other
<i>Animal production</i>	A primary purpose of the land is for livestock purposes	0 = none 1 = beef, poultry, pork, dairy, and/or other
<i>Agricultural production</i>	A primary purpose of the land is for agricultural purposes	0 = none 1 = yes to crop and/or animal production
<i>Agricultural related business</i>	A primary purpose of the land is for business that supports agriculture	0 = none 1 = yes
<i>Renting land to agricultural users</i>	A primary purpose of the land is to rent to others for agricultural purposes	0 = no 1 = yes
<i>Personal recreation</i>	A primary purpose of the land is for personal recreation	0 = no 1 = yes
<i>Residence</i>	A primary purpose of the land is as a place of residence	0 = no 1 = yes
<i>Generations of family owning the land</i>	Number of generations the land has been owned in the same family	Numerical
<i>Succession to family</i>	Plans of succession to the next generation in the family	1 = land will be passed down 2 = land will not be passed down 3 = unsure of succession

### **3.4.2 Sphere Two: Minimum Compensation Requirements for Participation in MBI Programs for ES Provision**

The two research objectives in the second sphere of investigation were to discover how landowners' willingness to participate in MBI programs for ES provision differs between VO groups, and whether that willingness is affected by economic, lifestyle, and environmental non-payment benefits. Using the MBI program non-payment benefit scenarios (E1, E2, E3, and E4), crosstabulation and ANOVA were employed to test for statistical differences in the financial compensation required by landowners to participate.

The financial compensation was expressed in percentage of the costs the landowners expect they would face and would want returned in some way in order to participate in MBI programs for ES.

Hypothesis 3 states that members of each VO group require a different financial compensation. To test this, and since the financial compensation collected was in percentage ranges, and therefore ordinal, crosstab and chi-square tests were also used to identify if there were difference between response distributions according to VO groups. Converting the ordinal minimum compensation data into representative values and creating means allowed ANOVA and Tukey tests to be run. The response of “no compensation (0%)” was represented by a value of 0, the 1-50% range of compensation was represented with the midpoint value of 25, the 50-99% range of compensation was represented by the midpoint value of 75, “full compensation (100%)” was represented by the value of 100, and greater than full compensation was represented by a value of 125. The ANOVA was used to confirm the chi-square results, and the Tukey test was used to identify between which VO groups the mean financial incentives differed. Hypothesis 4, which states that the MBI scenarios with different non-payment benefits will create different distributions in the landowners’ willingness to participate, was tested in the same manner, except the sample was tested as a whole to compare the separate scenarios in the crosstabs and ANOVA tests.

To test the last hypothesis in this sphere of investigation some additional steps were required. Hypothesis 5 states that the changes in financial compensation required by landowners to participate caused by the different benefit scenarios vary between the VO groups. The first test was to include all of the responses to the four scenarios in one two-

way ANOVA to test the interaction between scenario and VO group. The second set of tests followed the same procedure as for the two hypotheses above, except the crosstabs and ANOVAs were run for each VO group individually against the benefit scenarios, and then for each benefit scenario individually against the VO groups. This allowed the relationships between the VO groups and benefit Scenarios to be examined more closely.

### **3.4.3 Sphere Three: TPB and Other Variables that Influence Landowners' Willingness to Agree with the Use of MBIs Programs for ES Provision**

The final objective of this thesis, undertaken in the third sphere of investigation, was to discover the personal, land, and situational factors that most strongly influence landowners' willingness to participate in MBI programs for ES provision to protect water quality. Hypothesis 6 stated that the TPB variables will be significant in explaining the variance of the landowners' agreement that MBIs should be used for ES provision, and this was tested using linear regression analysis.

For the dependent variable, an index was created for the general agreement with the use of MBIs for ES provision by averaging the responses to the two individual statements B3b-a and B3b-b. The dependent variable retained the original 1 to 7 scale of agreement, but allowed for half points on the scale. However, because of the response distribution, the dependent variable required a natural logarithmic transformation to provide a more normalised distribution.

The independent variables include the eight behavioral belief, six normative belief, and five control belief items from the TPB, the four expanded TPB statements, membership of the three VO groups, and twenty personal and land description variables (see Table 3.3. and Table 3.4 for list). Following Ajzen (1996), the TPB variables were

operationalized by calculating the behavioural beliefs by multiplying the strength by evaluation ( $b*e$ ), the normative beliefs by multiplying the strength by motivation to comply ( $n*m$ ), and the control beliefs by multiplying the strength by the power ( $c*p$ ) (see the TPB section in Chapter 2). Transformations and re-codings were made on a number of variables to make them more normally distributed and conducive for linear regression (see Table 3.2 and Table 3.3).

All independent variables were entered in the regression model initially using the Enter method, which adds them all simultaneously. The variable with the least significance was removed, and the model re-run. This was repeated until removal of any of the independent variable would negatively impact the adjusted  $R^2$  value. Variables with correlation issues or missing data (i.e., household income) were also removed from the model. After removing variables due to multicollinearity, Cook's Distance revealed that there were many influential, unusual cases. Instead of removing a large portion of the sample, the top three cases were removed, the highest of which also had the highest leverage, and the other two were the only cases with standardized residuals above a 3.0 z-score. The results of the analyses for the three spheres of investigation are outlined in the following chapter.

## ***CHAPTER FOUR***

### **4 RESEARCH RESULTS**

This chapter presents the data collected via the phone survey and the results from its analysis. First, a description of the respondents is provided followed by the results from the three spheres of research that addressed the four research objectives. The first sphere used cluster analysis to group landowners based on their values and crosstabs and chi-square tests to identify the value orientations of the groups and provide a description of the landowners. The second sphere reports the compensation required by the landowners to supply ES through MBI programs and the variation through the different VO groups and the scenarios with different non-payment benefits from participation. The third sphere reports the results of the regression model that tested the TPB, with its expanded variables and additional control factors of land and landowner socio-demographic characteristic. The chapter ends with a list of the evidence found that support the hypotheses.

#### **4.1 Respondents**

Of the 350 respondents who provided enough data for analysis, the socio-demographic data revealed that the respondents were reasonably representative of the population in the area with the exception of age and sex. This result was expected as this survey focused on landowners and/or main decision makers of land who tend to be male and older. The socio-demographic data can be seen in Tables 4.1 and 4.2. Table 4.1 contains the count and percentage of the total number of respondents for each variable. The variables included are sex, level of education, being a producer (which is further broken into

producing crops and producing animals), the percentage of the household income derived from use of their land (in ranges of 0-25%, 25-50%, 50-75%, and 75-100%), location of childhood upbringing (rural or urban), number of generations the family has owned the land, and the likelihood of succession of the land to the next generation. Table 4.2 provides the total numbers of respondents who reported their age, approximate net annual household income, and the amount of acres owned, as well as the minimum and maximum values, means, standard deviations, and variance for those variables. In addition to the data about income in Table 4.2, about 17% of the sample reported an approximate annual net household income of less than \$50,000 (CND), 33% reported between \$50000 and \$100000, 26% reported greater than \$100000, and 23.7 percent declined to provide an income to the interviewers.

**Table 4.1: Socio-Demographic and Land Data (Nominal and Ordinal Data)**

<b>Descriptor</b>	<b>N</b>	<b>%</b>
<b>Sex</b>	350	
Male	238	68.0
Female	112	32.0
<b>Education</b>	345	
No certificate, diploma or degree	33	9.6
High school diploma or equivalency certificate	88	25.5
College or other non-university diploma	158	45.8
University bachelor's degree	50	14.5
University Master's or Doctorate degree	16	4.6
<b>Producers</b>	299	85.4
Crops*	235	67.1
Animals & Livestock*	217	62.0
<b>% of income from land use</b>	345	
0 -25	169	49.0
25-50	38	11.0
50-75	31	9.0
75-100	107	31.0

\*Not mutually exclusive

**Table 4.1: Socio-Demographic and Land Data (Nominal and Ordinal Data) (Cont'd)**

<b>Descriptor</b>	<b>N</b>	<b>%</b>
<b>Recreational land use</b>	350	
Yes	162	53.7
No	188	46.3
<b>Upbringing</b>	350	
Rural	291	83.1
Urban	59	16.9
<b>Generations of family owning the land</b>	350	
1	176	50.3
2	61	17.4
3	76	21.7
4+	37	10.6
<b>Succession of land to family</b>	350	
Yes	213	60.9
No	89	25.4
Unsure	48	13.7

**Table 4.2: Socio-Demographic and Land Data (Integral Data)**

<b>Descriptor</b>	<b>N</b>	<b>Min.</b>	<b>Max.</b>	<b>Mean</b>	<b>Std. Deviation</b>	<b>Variance</b>
Age	344	19	89	55.47	12.087	146.104
Net annual household income (\$)	267	10000	1500000	96573.03	133666.59	1.787E10
Acres owned	339	1	26000	1131.99	3190.13	1.018E7

## 4.2 Value Orientations

The first sphere of investigation addressed the first research objective to determine if landowners can be organised into separate groups based on the importance they place on economic, lifestyle, or environmental values in their land use decision making. Cluster analysis was used to test the first hypothesis, which created value orientation groups. Crosstabs and chi-square tests show where the significant differences in values between groups were. Crosstabs and chi-square tests were also used to test the second hypothesis

that members of these VO groups will portray different land and personal characteristics and the results are provided below.

#### **4.2.1 Value Statement Responses**

A total of 12 statements were used to identify the VOs of respondents in the survey. Three of the statements compare the importance of the economic, environmental, and lifestyle factors in land management decisions pairwise. The nine remaining statements represented a single aspect of economic, environmental, and lifestyle values. The response distribution to these statements for the entire sample can be seen in Table 4.3.

In general, the comparative value statements show that landowners tend to put economic factors as the primary motives in their land management, with environmental concerns second over lifestyle considerations. Statements A10 and A12, with mean scores of 4.62 and 4.53, respectively, show that economic and environmental factors take priority over lifestyle considerations. Statement A11 shows that the importance between economic and environmental factors is fairly balanced with a mean score of 4.08 on the Likert scale.

For the individual value statements, most received a general level of agreement from the respondents, with little disagreement to the environmental and lifestyle statements. The respondents showed very little variation in lifestyle with around 75% and 80% of them strongly agreeing to each of the three statements. Statements A1 and A7 in the economic group, however, had a far more polarizing effect on the respondents, with large portions either agreeing or disagreeing (Table 4.3). The breakdown of these responses relative to the value orientation groups will be explained below.

**Table 4.3: Value Statement Responses from Entire Sample**

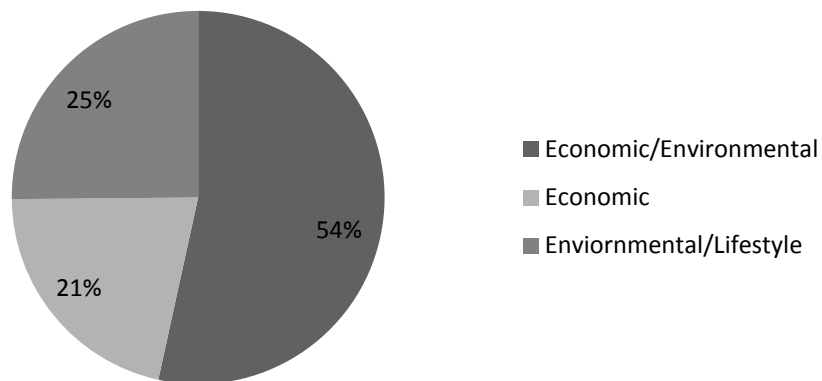
	% of Responses on Likert Scale of Strongly Disagree (1) to Strongly Agree (7)							Mean Likert Value
	1	2	3	4	5	6	7	
<b>Value Comparison Statements</b>								
A10) When faced with decisions that affect the way you manage your land, economic factors tend to outweigh lifestyle considerations.	6.9	6.9	6.9	19.4	28.0	21.1	10.9	4.62
A11) When faced with decisions that affect the way you manage your land, economic factors tend to outweigh environmental concerns.	8.9	9.1	16.0	23.4	21.4	16.6	4.6	4.08
A12) When faced with decisions that affect the way you manage your land, environmental concerns tend to outweigh lifestyle considerations.	2.9	5.7	8.3	32.9	26.0	17.7	6.6	4.53
<b>Economic Value Statements</b>								
A1) A maximum annual financial return from your property is your most important aim.	21.7	6.9	5.1	19.4	16.6	13.7	16.6	4.10
A4) Increasing the asset value or net worth of your land is very important to you.	1.7	1.7	2.6	13.7	19.1	24.9	36.3	5.66
A7) You view your land as first and foremost a business investment.	16.0	6.0	9.4	16.0	17.1	13.4	22.0	4.40
<b>Environmental Value Statements</b>								
A2) Managing environmental problems on your land is a high priority.	.9	1.1	.6	9.1	15.4	33.7	39.1	5.94
A6) Your right to do what you want with your property has to be balanced against wider environmental concerns.	3.1	3.4	3.4	12.6	20.9	28.0	28.6	5.43
A9) The most important thing is leaving your property in better shape than you found it.	.0	.3	.0	3.4	5.4	23.1	67.7	6.54
<b>Lifestyle Value Statements</b>								
A3) The lifestyle that comes with living in a rural area is very important to you.	.3	.6	.3	2.0	6.0	16.0	74.9	6.61
A5) For you, a rural environment is a better place to live than an urban environment.	.0	.3	.3	2.3	2.9	14.3	80.0	6.71
A8) Rural communities are a great place to live and raise a family.	.0	.0	.3	.9	5.7	17.4	75.7	6.67

#### 4.2.2 Clustering of Value Orientation Groups

After running the three comparative value statements (A10, A11, and A12) through multiple agglomerative hierarchical clustering with randomized seeding, three clusters were chosen. The dendrograms illustrated that the different algorithms and seeds

produced two to five different clusters from the same data set. Three clusters, however, were most common and was the number entered into K-means clustering to produce clusters with greater stability than those found in the agglomerative hierarchical clustering. Also a three cluster solution is more appropriate for statistical tests. The resulting distribution can be seen in Figure 4.1, with one group representing just over half of the sample and the other two around a quarter each. The naming process and descriptions are in the following sections.

### Value Orientations



**Figure 4.1: Landowner value orientation groups created using cluster analysis on the landowner responses to the three comparative value orientation statements.**

#### 4.2.3 Value Orientation Group Names and Confirmation

The largest cluster contained 54% of the survey respondents. From Table 4.4, this VO group: i) had the highest mean level of agreement with the statement that economic factors outweigh lifestyle considerations when making land management decisions (A10); ii) tended to agree that economic factors outweigh environmental concerns (A11); and iii) had the highest mean level of agreement with the statement that environmental

concerns outweighed lifestyle considerations (A12). These findings suggest that the group members are economically focused, but environmentally concerned, thus it was labelled as the “Economic/Environmental” VO group.

The smallest cluster contained 21% of the respondents and had: i) the highest mean level of agreement that economic factors outweigh environmental considerations (A11); ii) disagreed with the statement that environmental concerns outweigh lifestyle considerations (A12); and iii) agreed that economic factors outweigh lifestyle considerations (A10), although to a lesser extent than the Economic/Environmental group. Overall, this suggests that the group is economically oriented and not overly concerned about the environment. The label given for this value orientation group was simply the “Economic” VO group.

The third cluster had 25% of the survey respondents. This group disagreed with the two statements valuing economic considerations over environmental (A11) and lifestyle considerations (A10). The means shows that it disagreed slightly more with the economic over environmental statement than the economic over lifestyle statement, which is consistent with the group’s mean response being on the agreeing side of neutral with the statement that environmental considerations outweigh lifestyle concerns (A12). The mean responses by this group show that it is more environment and lifestyle oriented when making land management decisions, thus it was labelled the “Environmental/Lifestyle” VO group.

The ANOVA tests indicated that differences in the VO groups’ means of the three value comparison statements were statistically significant (Table 4.4), so at least one group mean was different from the other two. This significance was expected as these

statements were the basis for the cluster analysis. The post hoc Tukey test compared the means of each group pairwise and showed that all the means were significantly different from each other.

The differences in the mean responses to all nine individual value statements were also statistically significant among the groups based on the ANOVA results. The Tukey tests identified between which VO groups the statistically different means occurred. Members of the Economic/Environmental and Economic VO groups had the highest and second highest mean agreement with all economic value statements (A1, A4, and A7), but their differences in the mean agreements are not statistically significant according to the Tukey test (Table 4.4). Members of the Environmental/Lifestyle group disagreed with the first and third economic value statements about using the land to maximize financial return (A1) and considering it as first and foremost a business investment (A7). However, they agreed with the importance of increasing the asset value of their land (A4). For each of these three statements, the difference in mean responses between the Environmental/Lifestyle group and the other two were significantly different. For the responses to the environmental statements (A2, A6, and A9), the Economic/Environmental and Environmental/Lifestyle VO groups both scored means of high agreement and were not significantly different from one another. The means of the Economic group were significantly less than the other two for the environmental statements, except in A9 where its mean was only significantly less than the Economic/Environmental group. For the responses to the lifestyle statements, most landowners agreed strongly so there was not much variation. However, there were some significant differences in mean responses between members of the Economic group and

at least one of the other two VO groups. The above results confirm that the VOs of the groups created by the cluster analysis can be identified as economic/environmental oriented, solely economic oriented and environmental/lifestyle oriented. In conclusion Hypothesis one can be accepted, landowners can be grouped into distinct groups based on their value orientation.

**Table 4.4: Value Orientation Group Responses and Tests of Value Statements**

Value Statements Comparisons	Value Orientation Group	N	Mean	Std. Deviation	Mean Difference between Value Orientation Groups (Tukey Significance)			
					ANOVA F	1 and 2	1 and 3	2 and 3
A10) Economic vs. Lifestyle	Econ/Envi (1)	187	5.43	1.00	245.22 ***	0.33 *	2.97 ***	2.64 ***
	Econ (2)	75	5.11	1.03				
	Envi/Life (3)	88	2.47	1.19				
A11) Economic vs. Environment	Econ/Envi (1)	187	4.48	1.24	148.31 ***	-0.74 ***	2.23 ***	2.96 ***
	Econ (2)	75	5.21	1.14				
	Envi/Life (3)	88	2.25	1.13				
A12) Environment vs. Lifestyle	Econ/Envi (1)	187	5.19	0.91	94.79 ***	2.04 ***	0.88 ***	-1.16 ***
	Econ (2)	75	3.15	1.02				
	Envi/Life (3)	88	4.31	1.47				
<b>Economic</b>								
A1) Financial return	Econ/Envi (1)	187	4.63	1.96	34.45 ***	0.12	2.02 ***	1.89 ***
	Econ (2)	75	4.51	2.00				
	Envi/Life (3)	88	2.61	1.84				
A4) Asset value	Econ/Envi (1)	187	5.88	1.26	7.65 ***	0.20	0.69 ***	0.49 *
	Econ (2)	75	5.68	1.38				
	Envi/Life (3)	88	5.19	1.56				
A7) Business investment	Econ/Envi (1)	187	4.98	1.85	34.40 ***	0.31	2.01 ***	1.70 ***
	Econ (2)	75	4.67	1.98				
	Envi/Life (3)	88	2.97	1.95				

Economic/Environmental = 1, Economic = 2, Environmental/Lifestyle = 3

\* = p<0.1, \*\* = p<0.05 and \*\*\* = p<0.01

**Table 4.4: Value Orientation Group Responses and Tests of Value Statements  
(Cont'd)**

Value Statements	Value Orientation Group	N	Mean	Std. Deviation	ANOVA F	Mean Difference between Value Orientation Groups (Tukey Significance)		
						1 and 2	1 and 3	2 and 3
<b>Environmental</b>								
A2) Environmental Management	Econ/Envi (1)	187	6.06	1.04	9.08	0.61	-0.06	-0.67
	Econ (2)	75	5.45	1.35	***	***		***
	Envi/Life (3)	88	6.13	1.15				
A6) Rights Balanced	Econ/Envi (1)	187	5.61	1.32	6.23	0.72	0.11	-0.61
	Econ (2)	75	4.89	1.74	***	***		**
	Envi/Life (3)	88	5.50	1.64				
A9) Stewardship	Econ/Envi (1)	187	6.65	0.65	4.76	0.32	0.16	-0.16
	Econ (2)	75	6.33	0.88	***	***		
	Envi/Life (3)	88	6.49	0.94				
<b>Lifestyle</b>								
A3) Lifestyle	Econ/Envi (1)	187	6.61	0.88	2.79	0.18	-0.13	-0.31
	Econ (2)	75	6.43	0.98	*			**
	Envi/Life (3)	88	6.74	0.60				
A5) Rural better than urban	Econ/Envi (1)	187	6.76	0.58	5.74	0.29	-0.04	-0.33
	Econ (2)	75	6.47	1.06	***	***		***
	Envi/Life (3)	88	6.80	0.51				
A8) Community	Econ/Envi (1)	187	6.74	0.55	2.50	0.18	0.12	-0.07
	Econ (2)	75	6.56	0.66	*	*		
	Envi/Life (3)	88	6.63	0.81				

Economic/Environmental = 1, Economic = 2, Environmental/Lifestyle = 3  
\* = p<0.1, \*\* = p<0.05 and \*\*\* = p<0.01

#### 4.2.4 Value Orientation Descriptions

Examining the socio-demographic and land characteristic variables, none of the groups differed significantly with the following characteristics: i) age, ii) marital status, iii) number of children, iv) political leaning, and v) annual household income. However the three clusters differed significantly with respect to the following nine characteristic: i) sex; ii) education; iii) urban upbringing; iv) recreational land use; v) having some form of agricultural land use, which can be broken down into having some type of crop and some type of livestock; vi) the income derived from the use of the land; vii) succession expectation; viii) number of acres owned; and ix) the number of generations the family had owned the land (Table 4.5). The most substantial differences were between

landowners in the Environmental/Lifestyle VO and those in the other two VO groups. In conclusion, hypothesis two can be accepted: members of each VO group have different land and personal characteristics.

In general, those more economically focused were more likely to have the following traits: i) be less likely to be female; ii) have college and non-university diplomas; iii) be producers with more cropping and livestock; iv) have a greater portion of income from land use; v) have a lower importance of recreation as part of land use; vi) had a rural upbringing; vii) have had more generations of the family own and operate the land; viii) have a higher expectation of land succession to the next generation; and ix) own a large number of acres.

**Table 4.5: Value Orientation Descriptive Statistics**

Descriptor (Chi-square significance)	Total Sample		Econ/Envi		Econ		Envi/Life	
	N	%	N	%	N	%	N	%
<b>Sex**</b>	350		187		75		88	
Male	238	68.0	127	67.9	59	78.7	52	59.1
Female	112	32.0	60	32.1	16	21.3	36	40.9
<b>Education***</b>	345		186		74		85	
No certificate, diploma or degree	33	9.6	22	11.8	5	6.8	6	7.1
High school diploma or equivalency certificate	88	25.5	59	31.7	13	17.6	16	18.8
College or other non-university diploma	158	45.8	85	45.7	40	54.1	33	38.8
University bachelor's degree	50	14.5	17	9.1	13	17.6	20	23.5
University Master's or Doctorate degree	16	4.6	3	1.6	3	4.1	10	11.8
<b>Producers***</b>	299	85.4	167	89.3	67	89.3	65	73.9
Crops**	235	67.1	127	67.9	57	76.0	51	58.0
Animals & Livestock*	217	62.0	120	64.2	51	68.0	46	52.3
<b>% of income from land use***</b>	345		186		73		86	
0 -25	169	49.0	76	40.9	28	38.4	65	75.6
25-50	38	11.0	24	12.9	9	12.3	5	5.8
50-75	31	9.0	21	11.3	8	11.0	2	2.3
75-100	107	31.0	65	34.9	28	38.4	14	16.3

\* = p<0.1, \*\* = p<0.05, \*\*\* = p<0.01

Note: Crops and Animal production are not mutually exclusive



present the differences in the financial compensation caused by the four scenarios with different economic, lifestyle, and environmental non-payment benefits using the same analyses. Finally, the third set of results presents the crosstabs and ANOVA tests to determine if there is an interaction between the benefit scenarios and membership to VO groups on the financial compensation required to participate. These results assess the third, fourth, and fifth hypotheses, respectively.

#### 4.3.1 Compensation Requirement Differences between Value Orientation Groups

To examine the willingness of each VO group to participate in the MBI programs to provide ES the responses to the four benefit scenarios were analysed together. The Pearson Chi-square analysis (Table 4.6) showed that the levels of compensation requested differ significantly. Generally the distributions show that: i) landowners in the Environmental/Lifestyle VO group are significantly more willing to accept no financial compensation; ii) those in the Economic group are less willing to accept low financial compensation; and iii) those in the largest group, the Economic/Environmental VO group, are more willing to accept a small amount of compensation between 0% and 50% of costs but are the least willing to accept no compensation.

**Table 4.6: Compensation Response Crosstab for Value Orientation Groups**

Value Orientation Group	N*	Financial compensation relative to cost (distributions in % of N)					Total (%)
		0%	1-50%	50-99%	100%	> 100%	
Econ/Envi	672	15	44	29	10	2	100
Econ	272	17	32	31	17	4	100
Envi/Life	320	32	36	22	9	0	100
Total	1264	20	39	28	11	2	100

Pearson's Chi-square = 66.4 (Sig. = .000)

\* N is the total number of responses to each benefit scenario

The ANOVA in Table 4.7 used mean values converted from the ordinal data collected for the minimum compensation landowners required to participate in the MBI programs, explained in the methods chapter. The ANOVA confirms the findings of the Chi-square tests, by showing that the means of each VO group differ significantly. Furthermore, the Tukey test shows that the means of the compensation requested by the landowners in the three clusters are all significantly different from one another. The means show that the landowners in the Economic VO group requested the largest mean financial compensation, those who were in Economic/Environmental group were in the middle, and those in the Environmental/Lifestyle group requested the lowest financial compensation. In conclusion, hypothesis three can be accepted: landowners of different VO groups do require different amounts of financial compensation to participate in MBI programs for ES provision.

**Table 4.7: Compensation Response ANOVA for Value Orientation Groups**

Value Orientation Group	N	Mean	Std. Deviation	ANOVA F	Mean Difference between Value Orientation Groups (Tukey Significance)		
					1 and 2	1 and 3	2 and 3
Econ/Envi (1)	672	45.31	34.10	19.92	-7.17	10.31	17.48
Econ (2)	272	52.48	37.89	***	**	***	***
Envi/Life (3)	320	35.00	34.54				

\* = p<0.1, \*\* = p<0.05 and \*\*\* = p<0.01

#### 4.3.2 Incentive Requirement Differences between Scenarios

To examine how the willingness of the landowners to participate in the MBI programs for ES provision is affected by the different non-payment benefit scenarios, a crosstab and ANOVA was performed without the landowners being split into VO groups to test hypothesis four. Table 4.8 shows the responses of all the landowners in a crosstab to the

four scenarios of benefits. Scenario 1 is that the land management changes from participating would provide environmental benefits only. Scenario 2 refers to lifestyle benefits in addition to environmental benefits. Scenario 3 is about economic benefits in addition to environmental benefits. Finally, Scenario 4 is that landowners see all three types of benefits.

A Chi-square test was run to examine the association between scenario types and levels of financial compensation required by the landowners to participate. The analysis showed that the response distribution of at least one scenario was significantly different from the other scenarios. Looking at the distributions in Table 4.8, scenarios 1 and 4 vary the most from each other, with scenario 1 enticing the lowest willingness to accept low financial compensation and scenario 4 enticing highest willingness. Comparing scenarios 2 and 3, scenario 3 had a larger portion of landowners requiring financial compensation above 0% but below 50% of their expected costs to change their practices, and fewer required 100% or more.

**Table 4.8: Compensation Response Crosstab for Benefit Scenarios**

Scenario	N	Financial compensation relative to cost (distributions in % of N)					Total (%)
		0%	1-50%	50-99%	100%	> 100%	
1	316	10	32	38	16	3	100
2	316	20	39	26	13	2	100
3	316	20	44	26	9	1	100
4	316	28	43	21	7	1	100

Pearson's Chi-Square = 70.3 (Sig. = .000)

Using the same converted values for the financial compensation categories, each scenario was given a mean value and an ANOVA was run (Table 4.9). The ANOVA proved to be significant, confirming that the mean compensation levels required under

the four scenarios are not all equal. The Tukey post hoc test showed that: i) the mean amount of financial compensation required for scenario 1 was significantly greater than all other scenarios; ii) under scenario 4, the mean was significantly lower than all other scenarios; and iii) under scenario 3 the mean compensation requested was lower than under scenario 2, however, the two means were not significantly different. In conclusion, hypothesis four can be accepted: different combinations of environmental, lifestyle, and economic benefits from participating in providing ES cause landowners to require different amounts of financial compensation to participate in the MBI programs, most notably when all three benefits are provided together.

**Table 4.9: Compensation Response ANOVA for Benefit Scenarios**

Scenario	N	Mean	Std. Deviation	ANOVA F	Mean Difference between Benefit Scenarios (Tukey Significance)					
					1 and 2	1 and 3	1 and 4	2 and 3	2 and 4	3 and 4
1	316	56.57	35.16	18.38	11.39	15.82	22.07	4.43	10.68	6.25
2	316	45.17	36.44	***	***	***	***		***	*
3	316	40.74	33.80							
4	316	34.49	33.17							

\* = p<0.1, \*\* = p<0.05 and \*\*\* = p<0.01

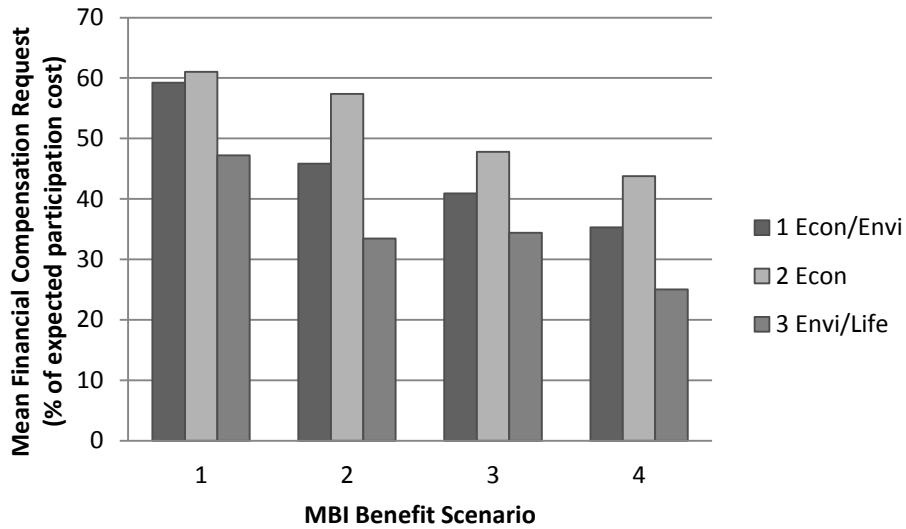
#### **4.3.3 Compensation Response Differences between Benefit Scenarios and Value Orientation Groups**

To determine if there is a relationship between different VO groups and the different non-payment benefit scenarios to participate in the MBI programs, two approaches were taken, testing hypothesis five. First, the financial compensation requirement responses to every scenario were included in a single two-way ANOVA to test if the interaction between the benefit scenarios and membership to the VO groups had any effect on the variance. The results show that the individual scenario and VO group variables were

significant, reflecting the results of the previous two hypotheses; however, the interaction variable, between the benefit scenarios and membership of the VO groups, were not significant (Table 4.10). The insignificance of the interaction means that the change in scenarios had no significant effect on the financial compensation required by landowners in one VO group over another. This relationship between scenarios and VO groups is illustrated in Figure 4.2, where landowners in one group do not respond all that differently from the landowners in other groups with respect to certain scenarios. However, when breaking down the responses into the individual scenarios, some interaction between MBI benefit scenario and value orientation can be seen.

**Table 4.10: Two-way ANOVA of Financial Compensation Requirements by Landowners with Scenario, Value Orientation Groups, and the Interaction of the Two as the Independent Variables**

Two-way ANOVA		
	F	Sig.
Benefit Scenario	18.38	.000
Value Orientation Group	19.92	.000
Scenario/ Value Orientation Group Interaction	.56	.759



**Figure 4.2: Mean financial compensation requested by landowners organized by non-payment benefit scenario and landowner value orientation group.**

The second method to determine if there is a relationship between different VO groups and the different non-payment benefit scenarios to participating in the MBI programs employed more thorough examination. Crosstabs and ANOVAs for each VO group were conducted to find differences among the requested financial compensation levels of the benefit scenarios (Tables 4.11 and 4.12). It can be seen through the crosstabs in Table 4.11 that the response distributions of the three VO group were significantly different for the Economic/Environmental and Environmental/Lifestyle groups but not the Economic group. This shows that the different benefit scenarios did not cause a large difference in the responses of landowners in the Economic VO group, but it did for the other two groups.

Interpreting the distributions, landowners in the Economic/Environmental VO group change their compensation requirements to lower amounts when they see any benefit in addition to the base environmental benefits from participating. Members of the

Environmental/Lifestyle group reduce their required compensation when any additional benefits are provided but the lifestyle benefits of Scenario 2 provide more incentive to make the reductions than the economic benefits in Scenario 3, rather than the other way around for the Economic/Environmental and Economic groups.

**Table 4.11: Compensation Crosstabs for Benefit Scenarios by Value Orientation Group**

Value Orientation Groups	Pearson's Chi-Square (Sig.)	Financial compensation relative to cost (distributions in % of N)							Total (%)
		Scenario	N	0%	1-50%	50-99%	100%	>100%	
Econ/Envi ***	51.8 (.000)	1	168	7	32	42	15	4	100
		2	168	13	48	24	12	3	100
		3	168	17	46	29	7	1	100
		4	168	22	49	23	6	0	100
		Total	672	15	44	29	10	2	100
Econ	14.8 (.252)	1	68	10	28	37	19	6	100
		2	68	13	28	35	22	1	100
		3	68	18	38	26	15	3	100
		4	68	26	32	26	10	4	100
		Total	272	17	32	31	17	4	100
Envi/Life **	25.1 (.014)	1	80	18	36	33	14	0	100
		2	80	39	30	23	8	1	100
		3	80	29	43	20	9	0	100
		4	80	44	38	13	6	0	100
		Total	320	32	37	22	9	0	100

\* = p<0.1, \*\* = p<0.05 and \*\*\* = p<0.01

Looking at the ANOVAs in Table 4.12, significant differences were found in the mean financial compensation requested for all three VO groups, but to a lesser degree for the Economic group. The Tukey post hoc tests show that the biggest differences between the compensation requirements of the VO groups is that for the Economic VO group only Scenario 4 was significantly different from Scenario 1, whereas for the other two VO groups all three scenarios were significantly different from Scenario 1. This difference for the Economic group was between Scenario 1 and Scenario 4, meaning the financial

compensation that these landowners required was only significantly reduced when all non-payment benefits were provided. Although not significant, it can be seen that the economic benefits do influence these Economic VO landowners to a greater extent than lifestyle benefits, more so than any of the other groups. The means in this table support the other interpretation made of the response distributions in Table 4.11. Additionally, the largest group, the Economic/Environmental VO, is clearly the most influenced by the identification of each individual benefit.

**Table 4.12: Compensation ANOVAs for Benefit Scenarios by Value Orientation Group**

Value Orientation Group	Scenario	N	Mean	Std. Deviation	Mean Difference between Benefit Scenarios (Tukey Significance)						
					ANOVA F	1 – 2	1 – 3	1 – 4	2 – 3	2 – 4	3 – 4
Econ/Envi	1	168	59.23	33.903	16.15	13.39	18.30	23.96	4.91	10.56	5.65
	2		45.83	35.107	***	***	***	***		**	
	3		40.92	32.189							
	4		35.27	30.628							
Econ	1	68	61.03	37.001	3.15	3.68	13.24	17.28	9.56	13.6	4.04
	2		57.35	36.410	**			**			
	3		47.79	37.341							
	4		43.75	38.964							
Envi/Life	1	80	47.19	34.904	5.88	13.75	12.81	22.19	-0.94	8.44	9.38
	2		33.44	36.008	***	*	*	***			
	3		34.38	33.132							
	4		25.00	30.812							

\* = p<0.1, \*\* = p<0.05 and \*\*\* = p<0.01

Another set of crosstabs and ANOVAs was conducted for each benefit scenario to find the differences in the compensation levels of the VO groups (Tables 4.13 and 4.14). From Table 4.13, only with Scenarios 2 and 4 was a response distribution from a VO group significantly different from the other two. For Scenario 2, the inclusion of the lifestyle benefits caused the differences in responses between the groups. As mentioned above and

seen in Figure 4.2, compensation requirements are high for landowners of the Economic group and low for the Environmental/Lifestyle group when lifestyle benefits are added to the base environmental ones. For Scenario 4, the Environmental/Lifestyle VO group is much more willing to participate with no or little financial compensation when all environmental, economic, and lifestyle benefits are present, than the other groups.

Overall, the relative differences between the VO groups reported earlier in Section 4.3.1 are reflected in Table 4.13: i) landowners in the Environmental/Lifestyle group are most willing to accept no or low financial compensation; ii) those in the Economic VO group require higher financial incentives than the other clusters, but more members are also willing to accept no financial incentives than those in the Economic/Environmental group; iii) landowners in the Economic/Environmental group are more willing to accept low financial incentives than those in the Economic group, but it seems that the members of this group expect at least a token of financial incentive because they are the least willing to accept no compensation.

**Table 4.13: Compensation Crosstabs for Value Orientation Groups by Benefit Scenario**

Scenario	Pearson's Chi-Square (Sig.)	Value Orientation Group	N	Financial incentives relative to cost (distributions in % of N)					Total (%)
				0%	1-50%	50-99%	100%	>100%	
1	12.5 (.130)	Econ/Envi	168	7	32	42	15	4	100
		Econ	68	10	28	39	19	6	100
		Envi/Life	80	18	36	33	14	0	100
		Total	316	10	32	38	16	3	100
2***	37.0 (.000)	Econ/Envi	168	13	48	24	12	3	100
		Econ	68	13	28	35	22	1	100
		Envi/Life	80	39	30	23	8	1	100
		Total	316	20	39	26	13	2	100
3	13.0 (.112)	Econ/Envi	168	17	46	29	7	1	100
		Econ	68	18	38	26	15	3	100
		Envi/Life	80	29	43	20	9	0	100
		Total	316	20	44	26	9	1	100
4***	29.4 (.000)	Econ/Envi	168	22	49	23	6	0	100
		Econ	68	26	32	26	10	4	100
		Envi/Life	80	44	38	13	6	0	100
		Total	316	28	43	21	7	1	100

\* = p<0.1, \*\* = p<0.05 and \*\*\* = p<0.01

With the ANOVAs in Table 4.14, all scenarios proved to create a significant difference in the means of the landowners' responses between the three VO groups. However, Scenarios 2 and 4 had the most significant results, supporting the findings from Table 4.13. The mean financial compensation required by the three VO groups show the same ranking in all scenarios with the landowners in the Environmental/Lifestyle group requesting the lowest compensation requirement, followed by the landowners in the Economic/Environmental group, and then the highest mean amount was required by the landowners of the Economic VO group. The mean compensation required by the landowners in the Economic/Environmental group was only significantly less than that of the Economic group in scenario 2, showing that lifestyle benefits are not strong incentives for the landowners with an Economic VO to participate. The mean financial

compensation requirement of the Environmental/lifestyle group was always significantly lower than those of the other two VO groups except for Scenario 3, showing that economic benefits are stronger incentives for landowners with Economic/Environmental or Economic VOs rather than an Environmental/Lifestyle VO.

**Table 4.14: Compensation ANOVAs for Value Orientation Groups by Benefit Scenario**

Scenario	Value Orientation Group	N	Mean	Std. Deviation	ANOVA F	Mean Difference between Value Orientation Groups (Tukey Significance)		
						1 and 2	1 and 3	2 and 3
1	Econ/Envi (1)	168	59.23	33.90	3.95**	-1.80	12.04**	13.84**
	Econ (2)	68	61.03	37.00				
	Envi/Life (3)	80	47.19	34.90				
2	Econ/Envi (1)	168	45.83	35.11	8.35***	-11.52*	12.40**	23.92***
	Econ (2)	68	57.35	36.41				
	Envi/Life (3)	80	33.44	36.01				
3	Econ/Envi (1)	168	40.92	32.19	2.94*	-6.87	6.55	13.42**
	Econ (2)	68	47.79	37.34				
	Envi/Life (3)	80	34.38	33.13				
4	Econ/Envi (1)	168	35.27	30.63	6.17***	-8.48	10.27*	18.75***
	Econ (2)	68	43.75	38.96				
	Envi/Life (3)	80	25.00	30.81				

\* = p<0.1, \*\* = p<0.05 and \*\*\* = p<0.01

In conclusion, the two methods of approach to test hypothesis five show conflicting results. The first, which used two-way ANOVA, did not support that the interaction between membership of VO groups and the benefit scenarios had an effect on the financial compensation required by the landowners. On the other hand, when the data was broken into the smaller analyses, differences were seen in the financial compensation when the VO groups and the benefit scenarios interact. Therefore hypothesis five can be accepted, the interaction of VO groups and benefit scenarios does have an effect on the required financial compensation, albeit not pronounced.

#### **4.4 Willingness to Accept the Use of MBIs for ES Provision**

The last set of results show the landowners' general agreement with the use of MBIs to provide incentives to change land management practices for the provision of ES to protect water quality. This section is the final sphere of investigation and addresses the fourth research objective to identify the factors that influence landowners' willingness to participate in MBI programs for ES provision. First, the statements used to compute the dependent variable will be examined, followed by a discussion of the independent variables, and finally the regression model will be discussed.

##### **4.4.1 Dependent Variable: General Agreement with the use of MBIs for ES Provision**

Two statements were used to measure the respondents' level of agreement with the use of MBIs for the provision of ES that protect water quality. The responses of the two statements were averaged to form a single dependent variable that represents the landowners' general agreement with the use of MBIs for ES provision, and their distributions can be seen in Table 4.15. The vast majority answered on the agreeing side of the Likert scale (i.e., greater than 4) for the two statements with 77.1% and 84%, respectively. The resulting distribution for the dependent variable shows 84.9% of the sample had a Likert value of greater than four, and less undecided at only 4.9% rather than 11.7% or 8.9%, respectively for the original statements.

**Table 4.15: Likert Scale Response Frequencies to the Agreement to Use MBIs for ES Provision**

<b>Likert scale of agreement</b>	<b>B3b-a) Agreement for MBIs to Prevent Fertilizer Run-off</b>		<b>B3b-b) Agreement for MBIs to Promote Buffer Zones Installation</b>		<b>Dependent Variable: General Agreement with MBIs (B3b-a &amp; B3b-b)</b>	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
1 Strongly disagree	16	4.6	10	2.9	8	2.3
1.5					0	0
2	9	2.6	4	1.1	0	0
2.5					11	3.1
3	14	4.0	11	3.1	8	2.3
3.5					9	2.6
4 Neither agree nor disagree	41	11.7	31	8.9	17	4.9
4.5					20	5.7
5	76	21.7	70	20.0	50	14.3
5.5					50	14.3
6	109	31.1	113	32.3	72	20.6
6.5					33	9.4
7 Strongly agree	85	24.3	111	31.7	72	20.6
Total	350	100.0	350	100.0	350	100.0

Table 4.16 provides descriptive statistics for the two original statements from the questionnaire and the latent MBI agreement variable. The mean response for B3b-a and B3b-b were 5.34 and 5.66, respectively, and therefore the latent variable's mean was 5.50. The latent variable's variance and standard deviation were both less than those of the two original statements. Skewness and Kurtosis were an issue for all three, so a natural logarithmic transformation was used on the latent dependent variable for use in the regression model.

**Table 4.16: Descriptive Statistics of Agreement to the Use of MBIs for ES Provision Variables**

<b>Descriptive Statistics</b>	<b>B3b-a) Agreement for MBIs to Prevent Fertilizer Run-off</b>	<b>B3b-b) Agreement for MBIs to Promote Buffer Zones Installation</b>	<b>Dependent Variable: General Agreement with MBIs (B3b-a &amp; B3b-b)</b>
N	350	350	350
Mean	5.34	5.66	5.4986
Std. Deviation	1.554	1.393	1.34436
Variance	2.414	1.939	1.807
Skewness	-1.156	-1.387	-1.209
Std. Error of Skewness	.130	.130	.130
Kurtosis	.983	2.071	1.555
Std. Error of Kurtosis	.260	.260	.260

#### 4.4.2 Independent Variables

The independent variables consisted of psychological and descriptive items. The psychological variables comprised: the eight behavioural belief items, the six normative belief items, and the five control belief items from the TPB; the two statements on past behaviour and the statements on self-efficacy and moral obligation from the extended TPB, and; the dummy variables for the three value orientation clusters identified in the previous sections of this chapter. The twenty descriptive variables can be seen in Table 3.3 and Table 3.4. After running preliminary models and correlation tests, fourteen independent variables remained adding to the explanatory power of the model. These variables can be seen in Table 4.17.

**Table 4.17: Regression Variables**

<b>Variable</b>	<b>Min.</b>	<b>Max.</b>	<b>M</b>	<b>SD</b>
MBI agreement	1.0	7.0	5.50	1.32
<i>be</i> : Environment quality (benefit)	1	49	35.65	11.06
<i>be</i> : Pride (benefit)	4	49	37.29	10.79
<i>be</i> : Economic (benefit)	1	49	30.73	12.98
<i>be</i> : Society (benefit)	3	49	33.85	11.97
<i>be</i> : Resource reallocation (cost)	1	28	10.56	6.16
<i>nm</i> : Government	1	49	25.50	13.95
<i>cp</i> : Knowledge	1	49	21.12	12.27
<i>cp</i> : Time and finances committed	1	49	21.75	12.31
Past management (without program)	1	7	6.05	1.18
Past management (with program)	1	7	3.73	2.04
Education: university	0	1	0.19	0.40
Percent of income from land use	12.5	87.5	42.91	33.33
Family land generations	1	6	1.95	1.14
Succession of land	0	1	0.61	0.49

#### 4.4.3 Regression Model

The ANOVA test of the final log-linear regression model proved it to be significant at the .001 level with an F statistic of 14.5. The model itself, as seen in Table 4.18, achieved an  $R^2$  of 0.39 and an adjusted  $R^2$  of 0.36, which falls within the range of similar TPB models. Table 4.18 shows the explanatory power and significance of each independent variable. Two independent variables were significant at the 0.01 level, another six at the 0.05 level, three at the 0.1 level, and three were not significant. Eight variables were from the core TPB, two from the extended TPB, and four were personal and land characteristics. Only five of the variables had negative coefficients.

The majority of the variables in the model were of the TPB. The three behavioural beliefs representing benefits of participating that would help society, the environment, and the landowners' sense of pride were significant at the 0.05 level with positive coefficients. According to the standardized beta coefficient, they were three of the most influential variables. The other two behavioural beliefs, significant at the 0.1 level, represented economic benefits and economic costs of participating and had positive and

negative coefficients, respectively. This shows that those who believe beneficial outcomes over negative ones are more likely to agree with the use of MBI programs for ES provision.

The only normative belief included was that the government was supportive of the action. This was significant at the 0.05 level, and with its positive coefficient, it tells us that landowners who are more influenced by the government's approval are more willing to agree with the use of MBI programs for ES provision.

Two control belief variables were included in the model. Having knowledge about the economic, social, and environmental outcomes was the most influential variable; it had a positive coefficient and was significant at the 0.01 level. The control belief that the landowners have their time and finances allocated elsewhere was significant at the 0.05 level, with a negative coefficient. These variables illustrate that landowners who thought knowledge of outcome would be an important factor in their ability to participate, and those who were less concerned about their time and finances being tied up elsewhere, were more likely to agree to the use of MBI programs for ES provision.

The only expanded TPB variables that contributed to the model represented the landowners' past behaviour for environmental benefit. Adopting environmentally beneficial land management practices on their own accord was statistically significant at the 0.05 level with a positive coefficient, but adopting practices as part of an organised program was not significant. These variables show that landowners who have already adopted practices that could provide ES would be more likely to agree to the use of MBI programs.

Finally, four personal and land characteristics were also included in the model. The percentage of income gained from use of the land was the most influential of the four and was the only other independent variable significant at the 0.01 level. The number of generations the land had been in the family was the only other significant variable of this group, at the 0.1 level. Both of these variables had negative coefficients. Neither having a university education nor having succession plans for the land were statistically significant in explaining the dependent variable, but their coefficients were negative and positive, respectively.

Multicollinearity was not a problem and heteroscedasticity was significantly reduced after transformations of the variables, so it should not create any biases. In conclusion, hypothesis six can be accepted: the TPB variables are significant in explaining the variance in the landowners' agreement that MBIs should be used for ES provision, although a few additional variables also are significant as well.

**Table 4.18: Coefficients of Regression Model of Theory of Planned Behaviour and Extended Variables Predicting Agreement with Use of MBIs for ES Provision**

<b>Independent Variables</b>	<b>B</b>	<b>Beta</b>	<b>Sig.</b>
(Constant)	.036		.827
<b>Behavioural Beliefs (Core TPB)</b>			
Participation benefits society, especially downstream (beneficial)	.007	.157	.021
Participation increases the quality of the environment (beneficial)	.007	.147	.025
Participation gives a sense of pride (beneficial)	.006	.131	.046
Participation provides additional economic benefits to land (beneficial)	.004	.094	.099
Participation takes resources away from other activities (cost)	-.007	-.077	.087
<b>Normative Beliefs (Core TPB)</b>			
Government	.004	.102	.037
<b>Control Beliefs (Core TPB)</b>			
Knowledge	.009	.203	.000
Time and finances allocated elsewhere	-.005	-.111	.025
<b>Expanded TPB</b>			
Past land management for environmental benefit on own accord (D3)	.049	.112	.015
Past land management for environmental benefit as part of organized program (D4)	.013	.050	.285
<b>Personal and Land Characteristics</b>			
Percent of income from land use (F8 recoded to group midpoints)	-.002	-.145	.003
Generations of family owning land (F12)	-.040	-.088	.059
University education (F6 recoded)	-.093	-.070	.121
Have succession plans (answered yes to F13)	.067	.063	.173
R = .62; R <sup>2</sup> = .39; Adjusted R <sup>2</sup> = .36		ANOVA: F = 14.538; Sig. = .000	

## 4.5 Hypotheses Results

The following table lists the hypotheses, the evidence that does or does not support them, and the strength of that evidence.

**Table 4.19: Hypothesis Confirmation**

<b>Hypothesis</b>	<b>Evidence</b>	<b>Outcome</b>
H1: Landowners do not have uniform values influencing their decisions in the same ways. Instead landowners can be grouped into distinct groups based on the importance they place on three value types; economic, environmental, and lifestyle.	<p>Cluster analysis based on responses to value comparison statements generated three VO groups (Figure 4.1) – Moderate evidence to accept hypothesis 1</p> <p>ANOVA and Tukey test on value comparison statements: all groups are significantly different from one another (Table 4.4) – Moderate evidence to accept hypothesis 1</p> <p>ANOVA and Tukey test on the nine value statements: at least one group of landowners is significantly different for each statement in a manner related to the clustering based on the value comparative statements (Table 4.4) – Strong evidence to accept hypothesis 1</p>	CONFIRMED: Landowners do not have uniform values and can be grouped based on the importance they place on economic, lifestyle, and environmental values. These value orientations hold true when tested against other value statements.
H2: Members of each value orientation group have different land and personal characteristics.	ANOVA and Tukey, and crosstabs and chi-square tests proved significant to differentiate landowners of the VO groups based on personal and land characteristics (Table 4.5) – Strong evidence to accept hypothesis 2	CONFIRMED: Although not all variables were significantly different among all groups, enough were to provide unique descriptions of each VO group.
H3: Members of each value orientation group require a different financial compensation to participate in MBI programs for the provision of ES.	<p>Crosstab and chi-square tests show that at least one VO group has a different response distribution of financial compensation needed to participate from the other groups (Tables 4.6) – Strong evidence to accept hypothesis 3</p> <p>ANOVA and Tukey test shows that all three VO groups have mean compensation requirements that are significantly different from one another (Table 4.7) – Strong evidence to accept hypothesis 3</p>	CONFIRMED: Each VO group requires different financial compensation to participate in MBI programs for ES provision.

**Table 4.19: Hypothesis Confirmation (Cont'd)**

<b>Hypothesis</b>	<b>Evidence</b>	<b>Outcome</b>
H4: Scenarios that contain different combinations of environmental, lifestyle, and economic benefits from participating in MBI programs for ES provision cause landowners to require different financial compensations.	Crosstab and chi-square show that the financial compensation requirements of landowners are not the same for all benefit scenarios (Tables 4.8) – Moderate evidence to accept hypothesis 4  ANOVA and Tukey test show that the financial compensation requirements for all scenarios are significantly different from one another except between Scenarios 2 and 3 (Table 4.9) – Strong evidence to accept hypothesis 4	CONFIRMED: The benefits scenarios result in different requests of financial compensation depending on the environmental, lifestyle or economic benefits listed.
H5: The changes in financial compensation required by landowners to participate in MBI programs for ES provision caused by the different benefit scenarios vary between the value orientation groups.	ANOVA scenario/VO group interaction variable was not significant (Table 4.10) – moderate evidence to reject hypothesis 5  Table 4.11, 4.12, 4.13, and 4.14 show through ANOVAs and chi-square tests that there are different effects of scenarios on the responses of the VO groups – Strong evidence to accept hypothesis 5	CONFIRMED: Although the interaction variable in the ANOVA of the mean compensation requirements did not confirm an interaction between VO groups and scenarios, a more detailed analysis shows that the changes in compensation caused by the scenarios does vary between VO groups.
H6: The TPB variables are significant in explaining the variance of the landowners' agreement that MBIs should be used for water quality supportive ES provision.	The regression analysis shows that the TPB provided many significant variables explaining the agreement with the use of MBIs for ES provision (Table 4.18) – Strong evidence to accept hypothesis 6	CONFIRMED: The TPB is suitable for explaining landowners' agreement with the use of MBIs for ES provision, but the extended TPB variable of past behaviour and the personal/land characteristics of percent of income obtained from land use and generations of family having owned the land were also significant.

#### 4.6 Summary

The rich data obtained in the survey provided many interesting results about the landowners and their beliefs about the use of MBIs for ES provision to protect water quality. The people within the sample were older than the average person in the study area and were predominately male, which aligns with the traditional role of men being

head of a household and in charge of land management decisions. However, with less economic dependence on land use, the larger the proportion of women became. Distinct value orientation groups of landowners were generated using cluster analysis based the relative importance of economic, lifestyle, or environmental values towards land management, confirming hypothesis one. Just over half of the landowners (54%) in the sample were placed into the Economic/Environmental VO group, which was economically oriented but environmentally aware. The Environmental/Lifestyle VO group contained a quarter of the landowners, and less than a quarter (21%) was placed in the Economic VO group, which was dominated by economic values. The landowners in these VO groups differed not only in their values but also in certain personal and land characteristics, confirming hypothesis two.

The level of financial compensation that the landowners' requested varied significantly across the MBI benefit scenarios as well as across VO groups, confirming hypotheses three, four, and five. Scenario 4, with its additional economic and lifestyle benefits, incited most of the landowners to be willing to accept no or little financial compensation for participating in the ES land management program. Scenarios 3 (economic benefits in addition to environmental), 2 (lifestyle benefits in addition to environmental), and 1 (environmental benefits only) required successively higher compensation for participation. The levels of financial compensation requested by the landowners in the three different VO groups also varied significantly. The landowners in the Environmental/ Lifestyle VO group were the most willing to participate with no financial compensation. Those in the Economic/Environmental VO group were most willing to participate with a small amount of compensation greater than 0% of their cost

but less than 50%, although they were also the least willing to participate with no compensation. Those in the Economic VO group asked for the highest levels of financial compensation. According to the ANOVA there was no significant interaction between the VO groups and the scenarios to influence the level of compensation requested by the landowners. However, when examining the scenarios individually, it can be seen that some differences in influences from the scenarios do exist between those in different VO groups.

The MBI agreement variable showed that most landowners are supportive of the use of some form of MBI being employed to increase ES provision on their land to protect water quality. The regression model used to explain the variance of this dependent variable ended up containing fourteen independent variables: eight represented the three core elements of the TPB, two past behaviour variables, and four personal and land descriptive variables. The result of the regression was an adjusted  $R^2$  of 0.36. The TPB variables provided the majority of influential independent variables with the control belief of having knowledge about the potential economic, societal, and environmental outcomes of participating in MBI programs for ES provision being the most influential. Behavioural beliefs about beneficial outcomes of participating also had a strong influence. Past behaviour was the only extended TPB variable to be included, and percentage of household income generated by the land was the most influential non-TPB variable. Overall this suggests accepting hypothesis six, the TPB variables provided a large amount of the explanatory power in the model. The following chapter will discuss the results.

## *CHAPTER FIVE*

### **5 DISCUSSION**

The results of the three spheres of investigation in this study have been laid out in the previous chapter; in this chapter the major findings are discussed in relation to the literature as well as possible implications of the research for policy in this area. The first sphere of investigation found that landowners in Southern Alberta can be grouped based on their value orientations, which were also shown to differ according to socio-demographic characteristics. The second sphere illustrated how different benefit incentives affect the financial reward that landowners would need to receive in order to participate in ES provisioning programs. How each VO group reacts to the different incentives was also examined. The third sphere identified the variables that influence landowners' willingness to accept the use of MBIs to provide financial rewards in ES provision programs. In doing so the effectiveness of the adapted TPB model was examined. These three spheres shed valuable light on the ES provision perspectives for water quality protection of Southern Albertan landowners within the study area and potentially beyond in regard to policy formation. When viewed together, the three spheres shed even more light on complex relations between the landowners' attitudes and values and their behaviour in environmental land management.

#### **5.1 Landowners and their Value Orientations**

Investigating the values of the southern Albertan landowners can provide useful information to environmental policy makers. Looking at the responses to the value comparison statements by the sample as a whole (Table 4.3), it can be seen that when it

comes to the way in which landowners manage their land, economic factors are the most important, with environmental concerns close behind followed by lifestyle considerations. Breaking the sample into the VO groups, however, allows for further distinction and insight into what drives landowner decision making.

Maybery et al. (2005) produced and tested three VO groups of Conservation (Environmental), Lifestyle, and Economic values using a survey of 552 Australian farmers. The VOs were based on the combination of the psychology literature that focused mostly on the economic and environmental values, and the sociology literature that focused on economic and lifestyle values. Their approach was adopted to guide the value orientation grouping for this thesis. However, instead of these three values forming their own unique VO groups, the landowners were classified into groups identified by a combination of the values identified by Maybery et al. (2005). These VO groups were labelled Economic/Environmental, Economic, and Environmental/Lifestyle after the most influential values they were clustered by.

Maybery et al. (2005) found that the economic values were independent from the conservation (environmental) and lifestyle values, but there was partial overlapping between lifestyle and conservation values. This reflects the formation of the Environmental/Lifestyle VO group quite well, as these landowners have strong environmental and lifestyle values. Furthermore, it was the only group to disagree with the importance of economic factors in land use decision making over those of environmental or lifestyle and it had the lowest agreement level for the other economic value statements. The only economic value statement that it did not disagree with was about desiring to increase the value of their land asset, rather than the statements about

increasing profits or viewing the land as a business investment. They clearly see their land as a place to live and enjoy and as a financial asset to be sold or passed on to the next generation, but not as a productive asset. In addition, these landowners were close to being neutral on environmental concerns being more important than lifestyle considerations. Therefore, it is obvious that economic values have little influence in their land stewardship, but environmental and lifestyle values as well as asset management have a strong influence together.

The Economic VO group is the near antithesis to the Environmental/Lifestyle group since it draws influence mostly from the economic values, which Maybery et al. (2005) showed to be the most separated from environmental values. Economic factors are more important to these landowners in their land management decision making than environmental or lifestyle considerations. However, lifestyle considerations are seen as more important than environmental concerns. Disagreeing that environmental concerns were more important than lifestyle considerations shows that this group has little regard for environmental values while lifestyle values hold some importance. However, when looking at the lifestyle value statements, all of the groups had a high agreement level, yet the only significant differences between the means showed that the Economic group agreed less than at least one of the other two groups, illustrating why it was named only with the economic value.

The Economic/Environmental VO group of landowners embraced the two values that Maybery et al. (2005) found to be the most distinct and thought to require ideologically different policy pathways. In the comparison statements for this group, economic factors were the most important, but it also agreed that environmental concerns were more

important than lifestyle considerations. The strong influence of both economic and environmental values were also demonstrated by the fact that the Economic/Environmental group's responses were not significantly different from the economic group regarding the economic value statements, or from the Environmental/Lifestyle group regarding the environmental value statements. That this group contains half of the sample should be encouraging for policy makers because it is a combination of the other two groups and therefore is likely to be receptive to policy pathways that are directed at either of them. The ideologically different policy pathways that Maybery et al. (2005) thought would be required may still be needed for the Economic and the Environmental/Lifestyle groups however.

The polarity of the Economic and Environmental/Lifestyle VO groups on the importance of economic and environmental values parallels the egoistic/altruistic value continuum used in the broader environmental behaviour literature. With lifestyle values not forming the basis of its own group, it is possible that the landowners could have interpreted these values in ways that reflected their own position on the egoistic/altruistic continuum. This could explain the unanimously high agreement with the lifestyle statements. The desire for lifestyle values by the Economic and Environmental/Lifestyle VO groups were likely more egoistic and altruistic in nature, respectively. The Economic/Environmental VO group, on the other hand, does not fit perfectly in the middle between the Economic and Environmental/Lifestyle groups since it was just as economically concerned as the Economic VO group, and nearly as environmentally concerned as the Environmental/Lifestyle group. This distinction in the

Economic/Environmental group shows that although the VO groups can represent the egoistic/altruistic continuum, they are also unique from the continuum.

Aside from values, the VO groups were also shown to differ in personal and land use characteristics. The Environmental/Lifestyle group was the most unique, with significant differences from the Economic/Environmental and the Economic VO groups. Arguably, the most central land use difference between the groups was the importance of production for the landowner. Those having an Environmental/Lifestyle VO were significantly less likely to be producers or be reliant on land use for household income than those with Economic or Economic/Environmental VOs. The landowners in the Economic and Economic/Environmental groups had the same high likelihood of being producers but the Economic VO group was more likely to have diversified farm operations producing both livestock and crops. In addition, this group was slightly more likely to have a greater reliance on land use for household income than those in the Economic/Environmental group. This shows that members of the Environmental/Lifestyle group were more likely to be hobby farmers or acreage owners, while those in the other two groups were more reliant on agricultural production, especially landowners of the Economic group. The finding corresponds with previous studies showing that labour-intensive farming types and high dependence of household income on farming activity decrease the likelihood of participation in agri-environmental measures (Defrancesco et al. 2008). For this study it can be stated that this high dependence aligns negatively with the environmental value and positively with the economic ones.

There was also a large difference in the proportion of females within each VO group. It has been found that females are more likely to have biospheric (environmental) VOs

rather than egocentric (economic) ones (Vaske et al. 2001). This is reflected by the relative proportions of female respondents in the Environmental/Lifestyle and the Economic VO groups. However, others like Stern et al. (1993, Stern and Dietz 1994) have shown there is no difference in the strength of egotistic, social-altruistic, or biospheric VOs between the sexes when it comes to environmental concern, but females have stronger beliefs about any adverse consequences, whether to themselves, other people or the non-human environment. This may make the Environmental/Lifestyle VO group as a whole more concerned about the adverse environmental consequences of their land management. However, the large proportion of females in the Environmental/lifestyle VO group might not alone be due to the fact that females have stronger environmental values than men. Feminist theory has pointed out that home and work are gendered; the work place being the domain of the male and the home, the female (Aitken 1992). In traditional farming businesses the primary decision maker of the farming operation is male and in this study it has been shown that if the land is an acreage or a hobby farm, women take on a larger role in land management as it deals more with managing their rural lives rather than work place. Consequently, it is not surprising that the Environmental/Lifestyle VO group had the greatest proportion of female respondents as a primary land manager and the Economic group has the lowest.

The landowners' rural or urban upbringing, the number of generations the family has owned the land and succession planning were also correlated to the VO groups. Members of the Economic group proved to have stronger rural ties as they were most likely to be raised in a rural setting, had a longer family history owning the land, and they were the most certain about succession of the farm to the next generation. The opposite was seen

in the Environmental/Lifestyle group while the Economic/Environmental group ranged between the other two for all three variables. These rural ties seem linked to more traditional utilitarian beliefs of the Economic VO group. Longer family history on the land might have transferred these traditional beliefs through the generations, and those who plan to follow the tradition of passing the farm on to the next generation are less likely to participate in environmental programs as they focus on building the productive capacity of the farm to make it viable for the next generation; that is they have to take a more long term view on risk. Those who don't have successors may be more willing to adopt less intensive farming operations to become more environmentally friendly as shown by Potter and Lobley (1992).

The rural or urban question in relation to environmental concern has been asked for decades and in earlier research it has been shown to be positively correlated to socialization in larger urban areas while farmers and their offspring are less likely to support environmental protection (Lowe and Pinhey 1982). This illustrates the main difference between the Environmental/Lifestyle group's environmental support and the Economic group's more traditional utilitarian beliefs. However, in more recent research, Huddart-Kennedy et al. (2009) found that although rural people who were raised in an urban setting had stronger environmental worldviews and weaker egoistic values than rural people who were socialized in an rural area, there was no difference in the extent of environmentally supportive behaviour. This dynamic between older and more recent research is also present when examining the environmental concern of rural and urban residents in general. The older studies showed rural residents expressed much less environmental concern than their urban counterparts (Lowe and Pinhey 1982, Alm and

Witt 1997), while the more recent research shows that the difference is negligible, although specific concerns are more salient to one group or the other (Berenguer et al. 2005, Huddart-Kennedy et al. 2009, Bjornlund et al. 2014). The Economic VO group seems to still be more relatable to the older studies, while the Economic/Environmental group relates more with the newer studies that show equal environmental concern or performance to those who grew up in urban settings.

The findings related to education were somewhat contradictory to the general literature, which finds that people with higher education are more likely to engage in pro-environmental spending (Alm and Witt 1997) and stewardship (Huddart-Kennedy et al. 2009), or express environmental concern (Vaske et al. 2001, Klineberg et al. 1998). However, this study found that the pro-environmental Economic/Environmental group had the lowest proportion of landowners educated above high school and the Economic group was most likely to have an education beyond it. On the other hand, although the Environmental/Lifestyle group did not have the largest portion educated beyond high school, it did have the largest portion with university degrees. With that it can be seen that there is no clear gradient with amount of education and pro-environmental attitudes, but perhaps there is a relationship with the type of education. The agriculturally productive Economic VO group had the largest portion of landowners with college diplomas, which were likely to be agriculturally related or more utilitarianly oriented towards economic values. While there is also a large proportion with a college diploma in the Economic/Environmental group, there are nearly as many with only a high school education or no completed formal education at all. Having a less formal agricultural education may mean they are more inclined to be influenced by government information

and be more willing to participate in environmental land management. Members of the Environmental/Lifestyle group are least likely to have an agriculturally related education since few of these landowners gain income from land use. The university degrees and college diplomas help them obtain higher paying jobs which can support their rural lifestyle as hobby farmers or acreage owners. The educations in this group allow for their land to not solely be seen as a business and that protecting the environment on their land protects their lifestyle.

These land and landowner characteristics add valuable insight into the three VO groups and help explain the importance of each value. For the agricultural producers, economic values were most important as they align with their business purposes. The Economic group may have also been less environmentally concerned because they have more traditional mentalities passed down from working the land for generations. The Economic/Environmental VO group seems less traditionally bound and more open to environmental values. This could also be a product of being less trained or focused in agricultural business. It is also interesting to note that this group seems to fall within a continuum of responses between the other two VO groups for most variables. The Environmental/Lifestyle group holds stronger environmental values because it reflects their lifestyle values (i.e., a better environment improves their lifestyle benefits) and they do not need to think about the economic impact as they do not depend on the land for their household income.

The vast majority of the respondents from all VO groups expressed a high level of agreement with lifestyle being an important value. For that reason it was not very useful in identifying and differentiating the groups. In spite of this, the lifestyle value should not

be overlooked, as it contains a social aspect that may help entice landowners to participate. Marshall (2004) found that farmers' preparedness to cooperate in implementing the plans of community-based programs of natural resources governance in Australia was more affected by social oriented factors, such as community benefits, than private or business ones. Therefore, he suggests that these social factors should be given greater representation than it has in the past when designing and implementing programs of natural resources governance. In the case of southern Alberta, the near uniform importance of lifestyle values could suggest that addressing the lifestyle benefits of a program for ES may improve the likelihood of its success.

## **5.2 Financial Compensation and Intrinsic Benefits from ES Program Participation**

The main purpose of ES land management programs is to protect ES that provide benefit to the environment for ourselves, others, wildlife and habitat, and future generations, and in the context provided in the questionnaire the main purpose was to protect water quality. For someone to act solely for these reasons, that person would require a high level of altruism. As the investigations of this thesis research have shown, some people are not driven by altruism alone. For those more on the egoistic side of the continuum, it is important to stress that many ES provision activities not only create benefits for the environment, but may also create benefits directly to the landowner. They do so by improving environmental quality of the land and water resources and thereby the enjoyment of using it for recreation, health safety, and general wellbeing and they may also provide economic benefits such as increased land value and land productivity (GoA 2007, Knowler and Bradshaw 2007). However, these benefits tend not to be focused on

by policy makers when making programs for ES provision, since they are not the purpose of the programs. In the interest of developing MBIs that provide even further financial incentives to entice landowner participation, policy makers should know how to maximise the effectiveness of the financial compensation they are willing to pay. To do this, the additional benefits of the program need to be identified and made clear to the landowners. In this section we discuss the impact of introducing lifestyle and economic benefits, which landowners might not normally be aware of in addition to the environmental benefits, on the level of financial compensation required to entice landowners to accept ES programs.

The graph in Figure 4.2 illustrates how the mean financial incentive landowners require lowers with additional benefits included in the benefit scenarios and how it differs between the VO groups. From the average of the entire sample (Table 4.9), including both the economic and lifestyle benefits to the environmental ones (Scenario 4) as outcomes from participating in ES programs reduced the financial compensation required to participate by 22% compared to the baseline of the environmental benefits only scenario (Scenario 1). The individual addition of the economic benefits (Scenario 3) and lifestyle benefits (Scenario 2) also created significant reductions from the baseline Scenario 1. However, the responses to Scenario 4 were still significantly lower than both. This simple result confirms that when designing and implementing ES programs, policy makers should identify as many additional benefits of implementing a proposed program as possible and communicate them to the landowners. The lifestyle and economic benefits will provide incentive to those who are less environmentally altruistic, and the

smaller amounts of financial compensation payments would cut down the implementation cost of the program.

Looking at the results in Section 4.3.3, evidence can be seen that each group of landowners respond to the different benefits according to their VO. The Environmental/Lifestyle group was the least motivated by economic benefits but it had the lowest mean financial compensation requirement for all scenarios. ‘No financial incentive’ was the most common response for this group when lifestyle benefits were included (Scenarios 2 and 4), otherwise they most commonly required a small amount of compensation for only environmental benefits (Scenario 1) or the addition of economic benefits (Scenario 3). The inherently low financial compensation requirement from the Environmental/Lifestyle group can be attributed to their strong altruistic environmental values, while the lifestyle benefits provide the group with enough personal gain that many would be willing to participate with none of their implementation cost returned to them. Since economic values are not important to this group, it is not unexpected that economic benefits failed to outperform lifestyle benefits in reducing the financial incentive, unlike for the other two VO groups. These results are not surprising as the Environmental/Lifestyle landowners are less reliant on their land for income. Additionally, their landholdings are smaller in area and predominately used for lifestyle purposes so participating in such programs will come at little or no financial risk and they gain in environmental and lifestyle benefits.

The Economic VO group had the highest mean financial compensation requirement out of the three groups for each benefit scenario, illustrating its limited environmental concern and the limited influence of the additional benefits. Only when all benefits were

presented in Scenario 4 was a significant difference from Scenario 1 seen. However, the economic benefit seems to be the greatest driver for this group to reduce their required financial compensation, and although it was not significantly different than when the lifestyle benefits were presented on their own, the economic benefit reduced the mean of financial compensation 10% more than the lifestyle benefits. The responses of the Economic VO group to these benefit scenarios live up to the business only approach outlined in their value orientation description. With the least environmental concern, the most intensive agricultural production and the highest reliance on land use for income, all found to be related to non-participation in agri-environmental measures (Defrancesco et al. 2008), it is clear that members of the Economic VO group would be the most reluctant to participate, even with added benefits. The egoistic/altruistic value continuum is again illustrated between this group and the Environmental/Lifestyle VO group.

The Economic/Environmental VO group again did not fall into the egoistic/altruistic continuum exactly between the other two groups. It had almost the same high financial compensation requirements as the Economic group for Scenario 1, showing that it is not as environmentally altruistic as the Environmental/Lifestyle group. Furthermore, it was also the least willing to participate in any of the scenarios with no financial compensation. However, once additional benefits were included, the group significantly increased its willingness to participate with a low financial compensation; it had the most significant drops in compensation means of all the value orientation groups. This shows that members of this group, which is over 50% of the sample, see the value of the environmental programs and the benefits they provide, but they need at least a token of

financial contribution/subsidy. It falls in line with their environmental concerns but also in line with the business needs of their farming operations.

In this part of the study it was shown that overall the financial compensation needed to adopt MBIs for ES can be reduced by 22% through informing the landowners that they can gain lifestyle and economic benefits in addition to the environmental by implementing the land management changes. It also demonstrated that the three VO groups do behave differently in response to the incentives and benefits offered to them. The Environmental/Lifestyle VO group was the most willing to participate solely for environmental reasons, but was also highly influenced by lifestyle benefits. The Economic VO group was the least willing to participate in any scenario but economic benefits seem to provide some motivation to reduce the financial compensation they would require from the program. Finally, the Economic/Environmental VO group was most influenced by additional benefits. Environmental benefits alone were not enough to convince them to participate without the aid of a larger amount of financial compensation, but once they see benefits to themselves, whether through lifestyle or economic values, the Economic/Environmental group's willingness to participate with a small amount of compensation increased significantly. It is also interesting to note that not enough landowners chose the disincentive of a threat of a fine for not participating over the financial incentives to use it in the analysis, showing that landowners in Southern Alberta prefer rewarding MBIs over penalising mechanisms.

### **5.3 The Theory of Planned Behaviour and Landowners' Agreement with the Use of Market-Based Instruments**

The third and final sphere of investigation in this thesis was to discover what factors influence the willingness of landowners to agree with the use of MBIs to promote the provision of ES for the protection of water quality, and to determine if the TPB and expanded factors are useful tools for explanation of this willingness. The high mean and negative skew of the responses to the statements forming the latent variable of general agreement for the use of MBIs in ES provision that protect water quality shows that most landowners are willing. The adapted TPB model used was successful at explaining 36% of the variance (according to the adjusted  $R^2$ ) in the regression model against this variable. Other adapted TPB models have shown a range of  $R^2$  values of about .20 to .55 in predicting water conservation (Trumbo and O'Keefe 2001, Lam 2006, Clark and Finley 2007) and riparian zone management (Corbett 2002, Fielding et al. 2005). The results from this study thus fall within a normal range of  $R^2$  values from TPB studies in different fields. A meta-analysis, conducted by Armitage & Conner (2001), of 185 independent studies indicated that the TPB variables account for, on average, 39% of variation in behavioural intentions.

With this TPB model being an adapted version, the Attitude Towards the Behaviour, Subjective Norms, and Perceived Behavioural Control variables that are core to the TPB were not directly included as outlined by Ajzen (2006). They were, however, all represented in the final regression model through five behavioural beliefs, one normative belief, and two control beliefs that form them. This allowed the model to show which of these beliefs were most influential in predicting the dependent variable of the landowners' general agreement with the use of MBIs for the provision of ES. In addition,

the final model included only past behaviour from the extended TPB, and four landowner and land characteristics.

The Attitude Towards the Behaviour had a strong representation through the numerous behavioural beliefs that were included in the regression model. All but one behavioral belief was beneficial and they all gave representation to the three values used in forming the value orientations (i.e., increased quality of environment – Environmental; sense of pride and benefits to society – Lifestyle, and; additional benefits to society and taking resources away from other activities – Economic), showing that all three values need to be considered in the formation and education of ES programs. The VO groups did not contribute as factors in the regression model, but we can see that the altruistic beliefs of improving the quality of the environment and providing benefits to others in society are more powerful predictors than economic beliefs. It would then be safe to say that the Environmental/Lifestyle VO, who have more altruistic values, are more likely to accept the use of MBIs for ES provision than the Economic group. However, that may be because of their desire to protect the environment and not as related to the use of MBIs. Fielding et al. (2005) showed that landowners who intended to manage their riparian land were more driven by favourable cost-benefit analysis and having stronger beliefs about the beneficial outcomes and weaker beliefs about the negative ones, than were those with weak riparian management intentions. Since most of the behavioural beliefs included here were beneficial, it shows that beliefs about benefits are more associated with participation than those about cost. Therefore, all known benefits of participation need to be communicated to the landowners as much as possible to counteract any preconceived idea of cost that they might have of MBIs for ES provision.

For Subjective Norms, the only normative belief that predicted the agreement to use a MBI program to protect water quality through ES provision was the government's approval. The more people thought that the government would approve of participating, and the greater their motivation was to comply with what the government expects of them, the more likely they were to agree to participate. This is similar to the findings by Konisky et al. (2008) where more trusting individuals are more likely to support government action to address pollution and other global environmental issues. On the other end, May (2005) found that those who are more politically conservative are less likely to have a strong sense of duty to comply with voluntary approaches to environmental regulation. A rancher who participated in the preliminary interviews and showed values and characteristics of the Economic value orientation stated,

“Anytime you get talking government programs it gives way to abuse, it creates a false market place, and plus it creates more bureaucracy. All of which increase your taxes. So, no. To make a real short answer, no there shouldn't be any government programs because if it's not economically viable then you shouldn't be doing it anyway”.

This politically conservative remark clearly expresses that he thinks the government should not be promoting environmental programs. So another way to look at the findings of the government normative belief is that those who care less about the government's opinion are less likely to agree to MBIs programs, which might be a more useful statement.

For the last TPB variable, the Perceived Behavioural Control, the control beliefs were highly significant, one being the most significant variable in the regression with the strongest beta coefficient. This variable represented knowledge of the impacts of participating as control factor and had a positive coefficient. This result means that the

landowners will tend to participate in the MBI programs more actively if they strongly agree that having a clear understanding of the environmental, economic and social impacts of introducing MBIs represents an important factor in deciding to participate in the MBI programs aiming for ES provisions. This result supports strongly the findings in the literature. For instance, in a meta-analysis on farmers' adoption of conservation agriculture, Knowler and Bradshaw (2007) argue that 'awareness' has often been found to be positively correlated to adoption. Rosenberg and Margerum (2008), in their study, show that 'unfamiliarity' is a significant barrier for landowners to adopt conservation practices for watershed restoration in Oregon. Therefore the awareness of the environmental, economic, and social impacts of adopting new land management practices should be given important consideration in designing policies enticing landowners' participation in new MBI programs for ES provision to protect water quality.

The second control belief showed that those who believe that their time and finances are allocated elsewhere were less likely to agree to the use of MBIs in an ES program. Rosenberg and Margerum (2008) found that finances, time and labour were the most common barriers that prevented landowners from adopting conservation practices for watershed restoration in Oregon. This factor can also be directly related to the findings of Defrancesco et.al. (2008) that showed labour-intensive farming types constrained participation in agri-environmental measures. Therefore, it can be expected that landowners like those in the Economic value orientation group, who have intensive operations requiring large amounts of time and financing, are susceptible for this control belief to limit their willingness to participate.

Looking at the three variables suggested by other researchers using the expanded TPB (Ajzen 1991, Conner and Armitage 1998, Corbett 2002), past behaviour was the only one included in the final regression model. Past behaviour of adopting environment practices through organised programs and through their own accord were both included in the model with positive coefficients. This indicates that past land management for environmental purposes are good indicators of future participation. However, having done so on their own accord is a stronger predictor than having done so as part of an organised program, as it was the third most significant variable in the model while the assisted behaviour was not statistically significant in the model. This is likely due to the former having a deeper connection to the landowners' environmental values instead of being assisted in their choices by programs which required less of their own judgement. Whereas adopting environmental land management practises on their own shows signs that they likely have a strong environmental value orientation. However, a dairy producer from the preliminary interviews, who expressed views similar to the Economic/Environmental value orientation, answered in response to participating in new ES programs that he would do so if there was some sort of assistance or additional benefit since "for [him] it's not worth spending the time filling the paperwork out." This example illustrates the frustration and hassle with his past participation in ES programs that limit his desire to participate in more without some benefit to him. Much like in the incentive scenarios discussed earlier, providing information on the additional benefits one might gain other than just the environmental ones for participating might help sway those who are less environmentally oriented, or feel that participating in one program is enough, to agree to participate in a MBI program.

Only four of the land and landowner characteristics contributed to the regression model, and only two were significant. The first was the income from land use with a negative coefficient, which was the strongest variable in predicting the agreement to using MBIs for ES provision that was not core to the TPB. Drawing from Defrancesco et al.'s (2008) findings that those who are more reliant on their land for income are less likely to participate in agri-environmental measures, it can be seen here that that relationship is still true with the use of MBI programs for the provision ES. It is this group of people that will be most difficult to entice to participate in future MBI programs for ES provision, but providing incentives that speak to their economic values may help as seen with the Economic value orientation group and the additional benefit scenarios.

The second significant land or landowner characteristic was the number of generations the landowner's family had owned the land, which had a negative coefficient. A longer family history can lead to more traditional views of land management and aversion to government or outsider interference. This ties to the normative belief that shows those who care less about what the government thinks are also less willing to agree to the use of MBIs for ES provision. The rancher quoted that no government programs should exist to promote ES provision is a good example of this since he had long family ties to his land and other traditional views that match the Economic value orientation.

Although not significant, the negative coefficient of the university education variable does not match what could be expected based on the findings of the highly university educated Environmental/Lifestyle value orientation group which was most likely to agree to participate in ES provision programs. It is likely that since many environmental groups think that the use of MBIs instead of involuntary regulation will result in less

environmental protection overall (Hockenstein et al. 1997), that the university educated who tend to be more environmentally concerned may be less likely to agree with the wide use of MBIs but still require the least amount of financial incentive to actually participate in a MBI program. Finally, not significant either, those who were sure to have successors for their land were more likely to agree to the use of MBIs in ES programs, which opposes what was found by Defrancesco et al. (2008).

In summary, it can be said that most landowners are willing to adopt MBIs to protect water quality through ES provision, and the model helps us to understand why. The landowners' agreement is promising for successful implementation of MBIs in Southern Alberta to protect water quality and healthy ecosystems in general, and the model performed adequately compared to other TPB models.

However, the TPB is best suited for predicting specific behaviour so the generalized statements used may have limited its performance. Once specific programs are fleshed out, stronger models can be created with a narrower scope. That said, this model was able to show that those who are less concerned about the environmental, economic, and lifestyle effects of the programs and heavily rely on their land for income are the least likely to agree with the use of MBIs for water quality protection through ES provision. Those who value the benefits of the programs higher than the costs are more willing to participate, while those who see costs as greater are less willing. Past environmental land management is a sign that landowners are willing to accept the use of MBI programs for ES provision, mostly if they have done so on their own accord. Lastly, those with more generations of ownership of the land are likely to have more traditional views and therefore are less willing than others, which can be coupled with the lower willingness by

those who had less concern about what the government thought about the way they managed their land. Overall, the TPB provides many important factors in explaining the landowners' agreement with the use of MBIs in ES programs, consisting of a wider range from the behavioural beliefs, and fewer but potent normative and control beliefs.

## *CHAPTER SIX*

### **6 SUMMARY AND CONCLUSION**

This study explored the willingness of landowners in the Oldman River Basin of southern Alberta to participate in MBI programs for the provision of ES to protect water quality. It used values and attitudes as a base for explaining willingness to participate. To do this, three spheres of investigation were conducted to: 1) identify groups of landowners based on their Value Orientation (VO) and identify characteristics common to members of each group, and identify how groups differ with respect to these characteristics; 2) establish the willingness of VO groups to participate in MBI programs for ES provision and how they responded to different benefits from participation based on economic, environmental, and lifestyle benefits, and; 3) identify the factors that influenced the landowners' agreement with the use of MBI programs to protect water quality through ES provision, using an adapted version of the TPB framework. The first step was a literature review, which provided an overview of the links between values, attitudes and actual behaviour of landowners. The review found that studies like this are very context specific and as a result no universal explanatory factors of behaviour have been identified, but many are commonly used in previous studies.

#### **6.1 Key Findings**

This study identified that landowners within the Oldman River Basin can be clustered into three VO groups which can be classified as Economic/Environmental, Economic, and Environmental/Lifestyle. Members of the Economic group are more egocentric and are governed primarily by economic values, while for members of the

Environmental/Lifestyle VO group are more altruistic, being governed by environmental and lifestyle values. The Economic/Environmental VO group, which represented over half of the respondents, does not fit exactly in the middle of this egoistic/altruistic value continuum. The members are as economically concerned as those of the Economic VO group and nearly as environmentally concerned as those of the Environmental/Lifestyle group. For all VO groups, there was little variation with lifestyle value because they were important to all, and therefore should not be overlooked.

The VO groups also differed according to personal and land characteristics. The key difference between the groups was that both the Economic and Economic/Environmental groups contain large portions of agricultural producers, with the former being more reliant on it for income, while the Environmental/Lifestyle groups contained more acreage owners and hobby farmers. This creates a divide in how they view their lands and therefore manage it.

Members of the VO groups required different amounts of financial compensation to participate in MBI programs for ES provision, with those in the Environmental/Lifestyle group requiring the least and those in the Economic group requiring the most. Additionally, different combinations of environmental, lifestyle, and economic non-payment benefits reduce the financial compensation the landowners require, with the greatest reduction created when all benefits are presented together. There was also evidence that the interaction between the membership of VO groups and benefit scenarios had an effect on the required compensation levels. Here the differences found were that the Economic group started with high compensation requirements and the benefits had little effect on those requirements. The Economic/Environmental group also started with

high requirements, but any additional benefits resulted in larger drops in compensation. Finally the Environmental/Lifestyle group was the only group where lifestyle benefits were more influential in reducing the financial incentive requirements of their members than economic benefits.

The final part of the study showed that the TPB is useful in identifying the factors that influence landowners' willingness to participate in MBI programs that promote the provision of ES for water quality protection. Only fourteen independent variables were used in the regression model, most of which were TPB variables. Landowners who were less concerned about the environmental, economic, and social outcomes of participation, had weaker beliefs in beneficial outcomes of participation, rely heavily on their land for income, and haven't adopted land management changes for environmental purposes in the past were most likely not to support the use of MBIs for ES provision.

## **6.2 Policy Implications**

This study provides some sense that MBIs will be acceptable to most landowners in southern Alberta for the provision of ES to protect water quality and ecosystems in general. Studies such as this can help make planning efforts more efficient. An understanding of the different VOs that landowners in southern Alberta hold in relation to their land use, can aid policy makers and planners to tailor policies and programs to encompass the unique values of the smaller groups instead of only the average of the population. Flexible, well-designed MBIs would be ideal tools to entice participation of the Economic, Economic/Environmental, and Environmental/Lifestyle VO group members. The economic egoistic needs can be met with financial incentives, and those

with more altruistic environmental and lifestyle values were shown to be willing to participate with little or no financial incentive. The majority, however, will require at least a token of financial incentive since the Economic/Environmental group has economic needs as well but can recognise the other benefits from participating in environmental land management programs that also speak to their economic and lifestyle values. With the goal of ensure quality water for healthy aquatic ecosystems in the WFL strategy trailing behind efforts to attain this water for the drinking water and economic goals (Poirier and De Loe 2011), the lesson for policy makers and planners from this research is that the environmental benefits should not be targeted in the programs alone. When economic, lifestyle, and environmental benefits can be attained together from joining the program, it will increase the landowners' willingness to participate and therefore reduce costs of mitigation. This is reflected in the regression model with the TPB, where the most significant variable reflected concern over uncertain economic, social and environmental outcomes. Additionally, those who believed beneficial outcomes were more likely to occur were more likely to participate, so policy makers should focus on promoting as many additional benefits to the environmental purposes as possible.

### **6.3 Limitations and Areas for Further Study**

The biggest limitation of this study is that some of the statements used in the questionnaire may have been too general to polarize the level of agreement. This study took a general approach to discovering how values and attitudes affect their willingness to participate in MBI programs to provide ES to protect water quality, but without

specific programs that the landowners were familiar with, the hypothetical land management changes and costs of doing so relied on their best estimate. Further research could be undertaken when actual MBI programs for ES provision are being introduced so the goals of the programs, the changes required by the landowners, and the costs of doing so can be better explained to landowners so they can give more informed answers.

Asking the landowners in relation to a more specific situation would also aid in the outcome of the TPB model, as it is designed to predict specific behaviour, and in the case of this study it was used to understand the agreement with the use of unspecified policy that could have reduced its effectiveness. In addition, once programs are being planned a survey can target a specific group of landowners for whom the program is related, such as crop producers or livestock producers, which will reduce noise from landowners that may not be able to participate such as acreage owners. Another area of further study academically would be to expand the area of the study to see how well the three VOs hold up across the entire South Saskatchewan River Basin. The larger sample size should allow for separate regression tests for all three VO groups instead of just for the entire sample. That way the factors that account for variance in agreement to use MBIs for ES protection can be compared across VOs. Finally, an area of research that this can be expanded into is the inclusion of geographical location or land type as a variable. It would be interesting to see if different values or beliefs have any spatial relations within southern Alberta.

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## *APPENDIX I – Preliminary Landowner Interview Schedule*

1. In what ways do you think the rural environment is important for southern Alberta?
2. What sort of activities do you carry out on your land?
3. How long have you owned this land?
  - (a) Has it been passed down through generations?
  - (b) Do you hope to pass it on to your children?
4. What was the reason you became a landowner and what sort of benefits do you gain from it?
  - (a) Do these benefits strongly influence the way you manage your land?
5. Do you think other people benefit from the way you keep your land?
  - (a) How does their benefit affect the way you manage your land?
6. What values would you say you hold towards your land (economic, lifestyle, conservation, etc.)?
  - (a) Can you explain why you identified these values?
  - (b) Do these values influence the way you manage your land? Which ones are the most influential and how so?
7. For you, what is the best way to manage your land (i.e. to get the most value out of it, to make sure the ecosystem is not harmed, to keep it in good condition to pass it on to your children, etc.)?
8. Are you concerned about keeping your land environmentally healthy, if so, what are the reasons?
9. With only about 19% of Alberta's population being rural, and about a third of the province's land owned and used by rural landowners, mostly farmers and ranchers, do you think that they are doing their part to meet the needs of society and the environment?
  - (a) Should the rural population take on more responsibility to protect the environment, or is it the responsibility of the government?
10. From the *Water Act*, Alberta's *Water for Life* strategy outlines three main goals to ensure a safe and reliable supply of water for drinking, a healthy environment, and a sustainable economy. The conservation of natural ecosystems and stewardship of land to provide ecosystem goods and services is considered to be an important part of supplying the quality of water needed to meet the goals. Do you feel that there is much you can do to help provide these ecosystem goods and services?

11. What is your attitude towards being asked to supply ecosystem goods and services for the benefit of the environment and others in society?
  - (a) Have you ever changed the way you managed your land for these reasons before?
12. If the government, or an NGO, was to assist landowners in adopting beneficial management practices to supply ecosystem services, how would you prefer to receive this assistance?
  - (a) Do you think Market-based instruments such as payments for supplying ecosystem goods and services, credit trading, or tax benefits would be a useful and acceptable? How do you think they should operate?
13. What do you believe the advantages are of you supplying ecosystem goods and services on your property?
14. What do you believe the disadvantages are of you supplying ecosystem goods and services on your property?
15. Is there anything else you associate with you supplying ecosystem goods and services on your property?
16. Are there any individuals or groups who would approve of your supplying ecosystem goods and services on your land?
17. Are there any individuals or groups who would disapprove of your supplying ecosystem goods and services on your land?
18. Are there any other individuals or groups who come to mind when you think about supplying ecosystem goods and services on your land?
19. What factors or circumstances would enable you to supply ecosystem goods and services on your land?
20. What factors or circumstances would make it difficult or impossible for you to supply ecosystem goods and services on your land?
21. Are there any other issues that come to mind when you think about the difficulty of supplying ecosystem goods and services on your land?

## APPENDIX II – Over-the-Phone Questionnaire

### Int1

Hello, My name is \_\_\_\_\_. Today we're conducting a study with local landowners about land management decisions This is not a sales call.

This research is being done on behalf of researchers at the University of Lethbridge and the Alberta Water Research Institute.

Are you a rural landowner within the Municipal District of Willow Creek or the County of Lethbridge and above the age of 18?

*(If the person answering the phone is not a landowner over 18: ask if there is someone else in the household who is and ask to speak to that person)*

- <sub>1</sub> Yes
- <sub>2</sub> No
- <sub>3</sub> Call back later
- <sub>4</sub> Not interested

**T1**     *Show If Not\_landowner\_or\_over\_18*

Thank you for your time. Good bye.

Status Code: 71

**CB3**     *Show If callback\_in\_int1*

Go to call back page

Status Code: 99

**T0**     *Show If refused\_In\_int1*

Thank you for your time. Good bye.

Status Code: 74

### Int2

Would you consider yourself a long-term decision maker for your land, if not can I speak to someone in your home who is?

*(IF DECISION MAKER IS NOT HOME: Ask: Would there be a convenient time to call back to reach him/her?)*

*Long-term decision maker: The household member who makes land management decisions that may affect their land in the long run. People who recently moved onto a property qualify, but people who only rent land shouldn't qualify.])*

- <sub>1</sub> Yes
- <sub>2</sub> Yes, getting person
- <sub>3</sub> No, call back later
- <sub>4</sub> No, refusal

**T2**     *Show If refused\_in\_int2*

Thank you for your time. Good bye.

Status Code: 72

**CB1**     *Show If callback\_in\_int2*

Go to call back page

Status Code: 99

**Int3**

<<int3\_intro>>

Your number was randomly chosen, the survey is voluntary, your responses will be kept strictly confidential and anonymous. It will take about 25-30 minutes depending on your answers. and there are no known risks or anticipated discomforts expected from participating; however, you may withdraw at any time. Your opinions are very important to us and although there is no direct benefit to you in participating, your responses will help in the research of a Master's and a PhD student, as well as help inform policy makers on rural landowners' opinions and attitudes related to environmental issues and the use of market-based instruments to address them. Would you be interested in participating in this research project by answering some questions?

*(If NO: Ask: Would there be a more convenient time for me to call back?)*

- <sub>1</sub> Yes
- <sub>2</sub> No, call back later
- <sub>3</sub> No, refusal

**T3**     *Show If refused\_in\_Int3*

Thank you for your time. Good bye.

Status Code: 73

**CB2**     *Show If callback\_in\_int3*

Go to call back page

Status Code: 99

**Int4**

Great, before we get started I'll just let you know that if you have questions about the research, I can supply you with the contact information of Kyle Howard, a Master's student at the University of Lethbridge. Also, if you have questions regarding your rights as a participant, then I can give you the phone number to the Office of Research Services at the University of Lethbridge; however, the Office of Research Services will not be able to answer general questions about the study.

I'd also like to inform you that this call may be monitored for quality assurance purposes.

*(IF ASKED:*

**A1**

The first questions are about you, your land and the benefits you derive from it. Please indicate your level of agreement with the following statements using a 1 to 7 scale with 1 being “strongly disagree”, 7 being “strongly agree”, and 4 in the middle being “neither agree nor disagree”.

	Strongly disagree				Neither agree nor disagree			Strongly agree
a. A maximum annual financial return from your property is your most important aim.	<input type="radio"/> <sub>1</sub>	<input type="radio"/> <sub>2</sub>	<input type="radio"/> <sub>3</sub>	<input type="radio"/> <sub>4</sub>	<input type="radio"/> <sub>5</sub>	<input type="radio"/> <sub>6</sub>	<input type="radio"/> <sub>7</sub>	
b. Managing environmental problems on your land is a high priority	<input type="radio"/> <sub>1</sub>	<input type="radio"/> <sub>2</sub>	<input type="radio"/> <sub>3</sub>	<input type="radio"/> <sub>4</sub>	<input type="radio"/> <sub>5</sub>	<input type="radio"/> <sub>6</sub>	<input type="radio"/> <sub>7</sub>	
c. The lifestyle that comes with living in a rural area is very important to you.	<input type="radio"/> <sub>1</sub>	<input type="radio"/> <sub>2</sub>	<input type="radio"/> <sub>3</sub>	<input type="radio"/> <sub>4</sub>	<input type="radio"/> <sub>5</sub>	<input type="radio"/> <sub>6</sub>	<input type="radio"/> <sub>7</sub>	
d. Increasing the asset value or net worth of your land is very important to you.	<input type="radio"/> <sub>1</sub>	<input type="radio"/> <sub>2</sub>	<input type="radio"/> <sub>3</sub>	<input type="radio"/> <sub>4</sub>	<input type="radio"/> <sub>5</sub>	<input type="radio"/> <sub>6</sub>	<input type="radio"/> <sub>7</sub>	
e. For you, a rural environment is a better place to live than an urban environment.	<input type="radio"/> <sub>1</sub>	<input type="radio"/> <sub>2</sub>	<input type="radio"/> <sub>3</sub>	<input type="radio"/> <sub>4</sub>	<input type="radio"/> <sub>5</sub>	<input type="radio"/> <sub>6</sub>	<input type="radio"/> <sub>7</sub>	
f. Your right to do what you want with your property has to be balanced against wider environmental concerns.	<input type="radio"/> <sub>1</sub>	<input type="radio"/> <sub>2</sub>	<input type="radio"/> <sub>3</sub>	<input type="radio"/> <sub>4</sub>	<input type="radio"/> <sub>5</sub>	<input type="radio"/> <sub>6</sub>	<input type="radio"/> <sub>7</sub>	
g. You view your land as first and foremost a business investment.	<input type="radio"/> <sub>1</sub>	<input type="radio"/> <sub>2</sub>	<input type="radio"/> <sub>3</sub>	<input type="radio"/> <sub>4</sub>	<input type="radio"/> <sub>5</sub>	<input type="radio"/> <sub>6</sub>	<input type="radio"/> <sub>7</sub>	
h. Rural communities are a great place to live and raise a family.	<input type="radio"/> <sub>1</sub>	<input type="radio"/> <sub>2</sub>	<input type="radio"/> <sub>3</sub>	<input type="radio"/> <sub>4</sub>	<input type="radio"/> <sub>5</sub>	<input type="radio"/> <sub>6</sub>	<input type="radio"/> <sub>7</sub>	
i. The most important thing is leaving your property in better shape than you found it.	<input type="radio"/> <sub>1</sub>	<input type="radio"/> <sub>2</sub>	<input type="radio"/> <sub>3</sub>	<input type="radio"/> <sub>4</sub>	<input type="radio"/> <sub>5</sub>	<input type="radio"/> <sub>6</sub>	<input type="radio"/> <sub>7</sub>	
j. When faced with decisions that affect the way you manage your land, economic factors tend to outweigh lifestyle considerations.	<input type="radio"/> <sub>1</sub>	<input type="radio"/> <sub>2</sub>	<input type="radio"/> <sub>3</sub>	<input type="radio"/> <sub>4</sub>	<input type="radio"/> <sub>5</sub>	<input type="radio"/> <sub>6</sub>	<input type="radio"/> <sub>7</sub>	
k. When faced with decisions that affect the way you manage your land, economic factors tend to outweigh environmental concerns.	<input type="radio"/> <sub>1</sub>	<input type="radio"/> <sub>2</sub>	<input type="radio"/> <sub>3</sub>	<input type="radio"/> <sub>4</sub>	<input type="radio"/> <sub>5</sub>	<input type="radio"/> <sub>6</sub>	<input type="radio"/> <sub>7</sub>	
l. When faced with decisions that affect the way you manage your land, environmental concerns tend to outweigh lifestyle considerations.	<input type="radio"/> <sub>1</sub>	<input type="radio"/> <sub>2</sub>	<input type="radio"/> <sub>3</sub>	<input type="radio"/> <sub>4</sub>	<input type="radio"/> <sub>5</sub>	<input type="radio"/> <sub>6</sub>	<input type="radio"/> <sub>7</sub>	

**B1**

With the same 1 to 7 scale, please indicate your level of agreement with the following statements on water quality:

	Strongly disagree		Neither agree nor disagree			Strongly agree
a. <font color="blue">NEW QUESTION</font> Water quality issues are well recognized in your area.	<input type="radio"/> O <sub>1</sub>	<input type="radio"/> O <sub>2</sub>	<input type="radio"/> O <sub>3</sub>	<input type="radio"/> O <sub>4</sub>	<input type="radio"/> O <sub>5</sub>	<input type="radio"/> O <sub>6</sub> <input type="radio"/> O <sub>7</sub>
b. Instead of using regulation to control water quality, government should use other means such as voluntary approaches or market incentives.	<input type="radio"/> O <sub>1</sub>	<input type="radio"/> O <sub>2</sub>	<input type="radio"/> O <sub>3</sub>	<input type="radio"/> O <sub>4</sub>	<input type="radio"/> O <sub>5</sub>	<input type="radio"/> O <sub>6</sub> <input type="radio"/> O <sub>7</sub>
c. The provincial government should be the entity held accountable and responsible for water quality.	<input type="radio"/> O <sub>1</sub>	<input type="radio"/> O <sub>2</sub>	<input type="radio"/> O <sub>3</sub>	<input type="radio"/> O <sub>4</sub>	<input type="radio"/> O <sub>5</sub>	<input type="radio"/> O <sub>6</sub> <input type="radio"/> O <sub>7</sub>
d. Landowners, including farmers, ranchers, municipalities, golf courses, first nations, and so on, should be accountable and responsible for water quality.	<input type="radio"/> O <sub>1</sub>	<input type="radio"/> O <sub>2</sub>	<input type="radio"/> O <sub>3</sub>	<input type="radio"/> O <sub>4</sub>	<input type="radio"/> O <sub>5</sub>	<input type="radio"/> O <sub>6</sub> <input type="radio"/> O <sub>7</sub>

## B2

Next I will provide you with a definition followed by some related questions:

Ecosystem services is a term that collectively represents all the free services humans receive from nature, including clean water and air, crops, wood, flood protection, soil regeneration, and aesthetic and recreational values.

Globally these services are being degraded. Within the County of Lethbridge and the Municipal District of Willow Creek poor water quality reduces the provision of ecosystem services which impacts different people, including land owners, farmers, recreational users, municipalities, first nations, and so on.

Now on the same 1 to 7 scale, please indicate your level of agreement with the following two statements:

	Strongly disagree		Neither agree nor disagree			Strongly agree
a. <font color="blue">NEW QUESTION</font> Your land provides Ecosystem Services that benefit you and your family	<input type="radio"/> O <sub>1</sub>	<input type="radio"/> O <sub>2</sub>	<input type="radio"/> O <sub>3</sub>	<input type="radio"/> O <sub>4</sub>	<input type="radio"/> O <sub>5</sub>	<input type="radio"/> O <sub>6</sub> <input type="radio"/> O <sub>7</sub>
b. Improving water quality within the County of Lethbridge and the Municipal District of Willow Creek will increase the benefits that your family gets from your land	<input type="radio"/> O <sub>1</sub>	<input type="radio"/> O <sub>2</sub>	<input type="radio"/> O <sub>3</sub>	<input type="radio"/> O <sub>4</sub>	<input type="radio"/> O <sub>5</sub>	<input type="radio"/> O <sub>6</sub> <input type="radio"/> O <sub>7</sub>

## B3a

Now I will provide you with the context for the next questions.

Globally, governments are starting to use a number of instruments to complement regulations to deal with some environmental or ecosystem services issues. Financial incentives are voluntary instruments that provide a monetary incentive to change behaviour or practices. Financial disincentives require monetary

penalties for some behaviour or practice. A key reason that financial incentives and disincentives are used is that they can be more cost effective than just regulation. Market-based instruments incorporate these incentives and disincentive.

There are a broad suite of market-based instruments including subsidies, markets, cap and trades, payments for delivering ecosystem services, funding mechanisms, tax breaks, environmental taxes, and so on. Lessons from using market-based instruments are that they need to be set-up for a specific issue and be based on the values and nature of the community to ensure they fit.

Now on the same 1 to 7 scale as the previous questions, please indicate your level of agreement to the next two statements:

	Strongly disagree			Neither agree nor disagree			Strongly agree
a.	<p><b>NEW QUESTION</b>            The use of financial incentives to improve water quality is currently understood by members of the Municipal District of Willow Creek and the County of Lethbridge.</p>						
	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7
b.	<p>Cost effectiveness is an appropriate reason for using market-based instruments to improve water quality in this area.</p>						
	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7

**B3b**

Continuing on the same theme, there are some specific practices that lead to water quality problems. Manure management contributes to water quality problems and is an issue for a number of farmers in this area. Fertilizer and pesticide application is also a source of water quality problems. The following are specific issues that contribute to water quality problems in Southern Alberta; please indicate your level of agreement to the next two statements with the same 1 to 7 scale:

	Strongly disagree			Neither agree nor disagree			Strongly agree
a.	<p><b>NEW QUESTION</b>            As fertilizer run-off contributes to water quality issues market-based instruments should be used to provide incentives to change land management practices to reduce run-off.</p>						
	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7
b.	<p>As buffer zones in specific areas can help limiting run-off and thereby improve water quality market-based instruments should be used to provide incentives to install buffer zones.</p>						
	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7

**B4**

Now on the same 1 to 7 scale as the previous questions, please indicate your level of agreement to the next three statements, assuming the government has a **limited** amount of money to use to address the water

quality issues in the Municipal District of Willow Creek and the County of Lethbridge.

	Strongly disagree			Neither agree nor disagree			Strongly agree						
a. <b>NEW QUESTION</b> As the greater community benefits from increased water quality, the government should pay landowners to modify their land management practices to increase water quality.	<input type="radio"/> <sub>1</sub>		<input type="radio"/> <sub>2</sub>		<input type="radio"/> <sub>3</sub>		<input type="radio"/> <sub>4</sub>		<input type="radio"/> <sub>5</sub>		<input type="radio"/> <sub>6</sub>		<input type="radio"/> <sub>7</sub>
b. Land use regulations should be changed so that landowners with good conservation practices that benefit water quality are provided incentives and those with poor practices are penalised.	<input type="radio"/> <sub>1</sub>		<input type="radio"/> <sub>2</sub>		<input type="radio"/> <sub>3</sub>		<input type="radio"/> <sub>4</sub>		<input type="radio"/> <sub>5</sub>		<input type="radio"/> <sub>6</sub>		<input type="radio"/> <sub>7</sub>
c. The use of substances that are proven to degrade water quality should be limited to improve water quality. You would only agree with this approach if the landowners who reduce the use of these substances can earn a credit that can be sold to those landowners who are not able to reduce their use of these substances.	<input type="radio"/> <sub>1</sub>		<input type="radio"/> <sub>2</sub>		<input type="radio"/> <sub>3</sub>		<input type="radio"/> <sub>4</sub>		<input type="radio"/> <sub>5</sub>		<input type="radio"/> <sub>6</sub>		<input type="radio"/> <sub>7</sub>

**C1a**

Each of the following questions describes a possible outcome that might occur if you change the management of your land to improve the provision of ecosystem services. Using the same 1 to 7 scale as the previous questions, please indicate your level of agreement to the following statements:

	Strongly disagree			Neither agree nor disagree			Strongly agree						
a. <b>NEW QUESTION</b> It will help to improve environmental quality, such as habitat, or water and air quality.	<input type="radio"/> <sub>1</sub>		<input type="radio"/> <sub>2</sub>		<input type="radio"/> <sub>3</sub>		<input type="radio"/> <sub>4</sub>		<input type="radio"/> <sub>5</sub>		<input type="radio"/> <sub>6</sub>		<input type="radio"/> <sub>7</sub>
b. It will take away your time, labour, financial, and land resources from other activities.	<input type="radio"/> <sub>1</sub>		<input type="radio"/> <sub>2</sub>		<input type="radio"/> <sub>3</sub>		<input type="radio"/> <sub>4</sub>		<input type="radio"/> <sub>5</sub>		<input type="radio"/> <sub>6</sub>		<input type="radio"/> <sub>7</sub>
c. It will give you a sense of pride in how you take care of your land.	<input type="radio"/> <sub>1</sub>		<input type="radio"/> <sub>2</sub>		<input type="radio"/> <sub>3</sub>		<input type="radio"/> <sub>4</sub>		<input type="radio"/> <sub>5</sub>		<input type="radio"/> <sub>6</sub>		<input type="radio"/> <sub>7</sub>
d. It will provide economic benefits such as increased property values or productivity levels.	<input type="radio"/> <sub>1</sub>		<input type="radio"/> <sub>2</sub>		<input type="radio"/> <sub>3</sub>		<input type="radio"/> <sub>4</sub>		<input type="radio"/> <sub>5</sub>		<input type="radio"/> <sub>6</sub>		<input type="radio"/> <sub>7</sub>
e. It will reduce your ability to compete in local, regional, or global markets.	<input type="radio"/> <sub>1</sub>		<input type="radio"/> <sub>2</sub>		<input type="radio"/> <sub>3</sub>		<input type="radio"/> <sub>4</sub>		<input type="radio"/> <sub>5</sub>		<input type="radio"/> <sub>6</sub>		<input type="radio"/> <sub>7</sub>
f. It will help protect the well-being of future generations.	<input type="radio"/> <sub>1</sub>		<input type="radio"/> <sub>2</sub>		<input type="radio"/> <sub>3</sub>		<input type="radio"/> <sub>4</sub>		<input type="radio"/> <sub>5</sub>		<input type="radio"/> <sub>6</sub>		<input type="radio"/> <sub>7</sub>
g. It will increase paperwork and red	<input type="radio"/> <sub>1</sub>		<input type="radio"/> <sub>2</sub>		<input type="radio"/> <sub>3</sub>		<input type="radio"/> <sub>4</sub>		<input type="radio"/> <sub>5</sub>		<input type="radio"/> <sub>6</sub>		<input type="radio"/> <sub>7</sub>

tape.

- h. It will benefit others in society, especially nearby or downstream. <sub>1</sub> <sub>2</sub> <sub>3</sub> <sub>4</sub> <sub>5</sub> <sub>6</sub> <sub>7</sub>

**C1b**

Now, about the same set of outcomes that might occur if you changed the management of your land, please express how desirable you find each of these outcomes using a scale from 1 to 7, with 1 being highly undesirable, 7 highly desirable and 4 neither desirable nor undesirable or no opinion:

- |  | Highly<br>undesirable              |                                    | Neither desirable nor<br>undesirable or no<br>opinion |                                    | Highly desirable                   |                                    |                                    |
|--|------------------------------------|------------------------------------|---|------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| a. <b>NEW QUESTION</b><br>A healthy environment.                                       | <input type="radio"/> <sub>1</sub> | <input type="radio"/> <sub>2</sub> | <input type="radio"/> <sub>3</sub>                    | <input type="radio"/> <sub>4</sub> | <input type="radio"/> <sub>5</sub> | <input type="radio"/> <sub>6</sub> | <input type="radio"/> <sub>7</sub> |
| b. Taking away your time, labour, financial, and land resources from other activities. | <input type="radio"/> <sub>1</sub> | <input type="radio"/> <sub>2</sub> | <input type="radio"/> <sub>3</sub>                    | <input type="radio"/> <sub>4</sub> | <input type="radio"/> <sub>5</sub> | <input type="radio"/> <sub>6</sub> | <input type="radio"/> <sub>7</sub> |
| c. A sense of pride in how you take care of your land.                                 | <input type="radio"/> <sub>1</sub> | <input type="radio"/> <sub>2</sub> | <input type="radio"/> <sub>3</sub>                    | <input type="radio"/> <sub>4</sub> | <input type="radio"/> <sub>5</sub> | <input type="radio"/> <sub>6</sub> | <input type="radio"/> <sub>7</sub> |
| d. Economic benefits such as increases in your property value or productivity level.   | <input type="radio"/> <sub>1</sub> | <input type="radio"/> <sub>2</sub> | <input type="radio"/> <sub>3</sub>                    | <input type="radio"/> <sub>4</sub> | <input type="radio"/> <sub>5</sub> | <input type="radio"/> <sub>6</sub> | <input type="radio"/> <sub>7</sub> |
| e. A reduced ability for you to compete in local, regional or global markets.          | <input type="radio"/> <sub>1</sub> | <input type="radio"/> <sub>2</sub> | <input type="radio"/> <sub>3</sub>                    | <input type="radio"/> <sub>4</sub> | <input type="radio"/> <sub>5</sub> | <input type="radio"/> <sub>6</sub> | <input type="radio"/> <sub>7</sub> |
| f. Protection of the well-being of future generations.                                 | <input type="radio"/> <sub>1</sub> | <input type="radio"/> <sub>2</sub> | <input type="radio"/> <sub>3</sub>                    | <input type="radio"/> <sub>4</sub> | <input type="radio"/> <sub>5</sub> | <input type="radio"/> <sub>6</sub> | <input type="radio"/> <sub>7</sub> |
| g. Paperwork and red tape.   | <input type="radio"/> <sub>1</sub> | <input type="radio"/> <sub>2</sub> | <input type="radio"/> <sub>3</sub>                    | <input type="radio"/> <sub>4</sub> | <input type="radio"/> <sub>5</sub> | <input type="radio"/> <sub>6</sub> | <input type="radio"/> <sub>7</sub> |
| h. Providing benefit to others in society.   | <input type="radio"/> <sub>1</sub> | <input type="radio"/> <sub>2</sub> | <input type="radio"/> <sub>3</sub>                    | <input type="radio"/> <sub>4</sub> | <input type="radio"/> <sub>5</sub> | <input type="radio"/> <sub>6</sub> | <input type="radio"/> <sub>7</sub> |

**C2a**

Using the 1 to 7 scale, with 1 being “strongly disagree”, 7 “strongly agree”, and 4 “neither agree nor disagree”, state your level of agreement with the next set of statements about what other parties would think if you made changes to your land management to improve the provision of ecosystem services.

- |  | Strongly<br>disagree               |                                    | Neither agree nor<br>disagree      |                                    | Strongly agree                     |                                    |                                    |
|--|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| a. <b>NEW QUESTION</b><br>Members of your family would think it's a good idea.                                 | <input type="radio"/> <sub>1</sub> | <input type="radio"/> <sub>2</sub> | <input type="radio"/> <sub>3</sub> | <input type="radio"/> <sub>4</sub> | <input type="radio"/> <sub>5</sub> | <input type="radio"/> <sub>6</sub> | <input type="radio"/> <sub>7</sub> |
| b. The government would think it's a good idea.  | <input type="radio"/> <sub>1</sub> | <input type="radio"/> <sub>2</sub> | <input type="radio"/> <sub>3</sub> | <input type="radio"/> <sub>4</sub> | <input type="radio"/> <sub>5</sub> | <input type="radio"/> <sub>6</sub> | <input type="radio"/> <sub>7</sub> |
| c. Professionals, scientists and members of environmental or conservation groups would think it's a good idea. | <input type="radio"/> <sub>1</sub> | <input type="radio"/> <sub>2</sub> | <input type="radio"/> <sub>3</sub> | <input type="radio"/> <sub>4</sub> | <input type="radio"/> <sub>5</sub> | <input type="radio"/> <sub>6</sub> | <input type="radio"/> <sub>7</sub> |
| d. Your neighbours and peers would think it's a good idea.   | <input type="radio"/> <sub>1</sub> | <input type="radio"/> <sub>2</sub> | <input type="radio"/> <sub>3</sub> | <input type="radio"/> <sub>4</sub> | <input type="radio"/> <sub>5</sub> | <input type="radio"/> <sub>6</sub> | <input type="radio"/> <sub>7</sub> |
| e. People who gain recreational or   | <input type="radio"/> <sub>1</sub> | <input type="radio"/> <sub>2</sub> | <input type="radio"/> <sub>3</sub> | <input type="radio"/> <sub>4</sub> | <input type="radio"/> <sub>5</sub> | <input type="radio"/> <sub>6</sub> | <input type="radio"/> <sub>7</sub> |

aesthetic benefit from your land through activities like hunting, sight-seeing, and so on would think it's a good idea.

- f. Members of agricultural communities and organizations would think it's a good idea. <sub>1</sub> <sub>2</sub> <sub>3</sub> <sub>4</sub> <sub>5</sub> <sub>6</sub> <sub>7</sub>

### C2b

Now considering the same parties, please express **how much you want to do** what they think you should do, when it comes to making changes to your land management to improve the provision of ecosystem services. Answer on a scale from 1 to 7 with 1 being “not at all” and 7 “very much”:

- |   | Not at all                         |                                    |                                    |                                    |                                    |                                    | Very much                          |
|---|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| a. <b>NEW QUESTION</b><br>Your family.  | <input type="radio"/> <sub>1</sub> | <input type="radio"/> <sub>2</sub> | <input type="radio"/> <sub>3</sub> | <input type="radio"/> <sub>4</sub> | <input type="radio"/> <sub>5</sub> | <input type="radio"/> <sub>6</sub> | <input type="radio"/> <sub>7</sub> |
| b. The government.  | <input type="radio"/> <sub>1</sub> | <input type="radio"/> <sub>2</sub> | <input type="radio"/> <sub>3</sub> | <input type="radio"/> <sub>4</sub> | <input type="radio"/> <sub>5</sub> | <input type="radio"/> <sub>6</sub> | <input type="radio"/> <sub>7</sub> |
| c. Professionals, scientists and members of environmental or conservation groups.   | <input type="radio"/> <sub>1</sub> | <input type="radio"/> <sub>2</sub> | <input type="radio"/> <sub>3</sub> | <input type="radio"/> <sub>4</sub> | <input type="radio"/> <sub>5</sub> | <input type="radio"/> <sub>6</sub> | <input type="radio"/> <sub>7</sub> |
| d. Your neighbours and peers.   | <input type="radio"/> <sub>1</sub> | <input type="radio"/> <sub>2</sub> | <input type="radio"/> <sub>3</sub> | <input type="radio"/> <sub>4</sub> | <input type="radio"/> <sub>5</sub> | <input type="radio"/> <sub>6</sub> | <input type="radio"/> <sub>7</sub> |
| e. People who gain recreational or aesthetic benefit from your land through activities like hunting, sight-seeing, and so on. | <input type="radio"/> <sub>1</sub> | <input type="radio"/> <sub>2</sub> | <input type="radio"/> <sub>3</sub> | <input type="radio"/> <sub>4</sub> | <input type="radio"/> <sub>5</sub> | <input type="radio"/> <sub>6</sub> | <input type="radio"/> <sub>7</sub> |
| f. Members of agricultural communities and organizations.   | <input type="radio"/> <sub>1</sub> | <input type="radio"/> <sub>2</sub> | <input type="radio"/> <sub>3</sub> | <input type="radio"/> <sub>4</sub> | <input type="radio"/> <sub>5</sub> | <input type="radio"/> <sub>6</sub> | <input type="radio"/> <sub>7</sub> |

### C3a

In the next set of questions I will provide you with some factors that may or may not limit your ability to change your land management to improve the provision of ecosystem services. Please express your level of agreement with the following statements on a scale from 1 to 7 with 1 meaning “strongly disagree”, and 7 “strongly agree”:

- |  | Strongly disagree                  |                                    |                                    |                                    | Neither agree nor disagree         |                                    |                                    |  | Strongly agree |
|--|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|--|----------------|
| a. <b>NEW QUESTION</b><br>Not having a clear understanding of the environmental, economic and social impacts of introducing such changes is likely to be a factor. | <input type="radio"/> <sub>1</sub> | <input type="radio"/> <sub>2</sub> | <input type="radio"/> <sub>3</sub> | <input type="radio"/> <sub>4</sub> | <input type="radio"/> <sub>5</sub> | <input type="radio"/> <sub>6</sub> | <input type="radio"/> <sub>7</sub> |  |                |
| b. External economic factors and market forces are likely to be factors.   | <input type="radio"/> <sub>1</sub> | <input type="radio"/> <sub>2</sub> | <input type="radio"/> <sub>3</sub> | <input type="radio"/> <sub>4</sub> | <input type="radio"/> <sub>5</sub> | <input type="radio"/> <sub>6</sub> | <input type="radio"/> <sub>7</sub> |  |                |
| c. The physical characteristics of your land are likely to be factors.   | <input type="radio"/> <sub>1</sub> | <input type="radio"/> <sub>2</sub> | <input type="radio"/> <sub>3</sub> | <input type="radio"/> <sub>4</sub> | <input type="radio"/> <sub>5</sub> | <input type="radio"/> <sub>6</sub> | <input type="radio"/> <sub>7</sub> |  |                |
| d. The weather is likely to be a factor.   | <input type="radio"/> <sub>1</sub> | <input type="radio"/> <sub>2</sub> | <input type="radio"/> <sub>3</sub> | <input type="radio"/> <sub>4</sub> | <input type="radio"/> <sub>5</sub> | <input type="radio"/> <sub>6</sub> | <input type="radio"/> <sub>7</sub> |  |                |
| e. Having your time and finances allocated elsewhere is likely to be a factor.   | <input type="radio"/> <sub>1</sub> | <input type="radio"/> <sub>2</sub> | <input type="radio"/> <sub>3</sub> | <input type="radio"/> <sub>4</sub> | <input type="radio"/> <sub>5</sub> | <input type="radio"/> <sub>6</sub> | <input type="radio"/> <sub>7</sub> |  |                |

### C3b

The next set of questions is about the degree of difficulty the previous factors would add to the process of changing your land management to increase the provision of Ecosystem Services. Using a scale of 1 to 7, with 1 meaning the factor would make it “very difficult”, 7 “very easy” and 4 “neither difficult nor easy, or no opinion”, please respond to the following:

	Very difficult		Neither difficult nor easy, or no opinion			Very easy	
a. <b>NEW QUESTION</b> Not having a clear understanding of the environmental, economic and social impacts of introducing such changes.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7
b. External economic factors and market forces.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7
c. The physical characteristics of your land.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7
d. The weather.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7
e. Having your time and finances allocated elsewhere.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7

### D1

The next set of questions looks at your thoughts on how you manage your land and past actions you have undertaken that have provided environmental benefits. Please express your level of agreement with the following statements on a scale from 1 to 7 with 1 meaning “strongly disagree”, and 7 “strongly agree”:

	Strongly disagree		Neither agree nor disagree			Strongly agree	
a. <b>NEW QUESTION</b> You feel morally responsible to ensure that the management of your land does not cause harm.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7
b. How you treat your land doesn't make a difference to the quality of the environment.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7
c. You have adopted land management practices to fix environmental problems and benefit the ecosystem on your own accord without the aid of government or other organised programs.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7
d. You have adopted land management practices as part of government or other organised programs to fix environmental problems and benefit the ecosystem.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7

## Eint

Thank you - Now, Increasing the supply of ecosystem services often requires landowners to change the way they manage their land. Such changes are often associated with costs in terms of money and time. Market-based instruments try to provide financial incentives or disincentives to encourage landowners to make such changes. However, increasing the supply of ecosystem services might also provide benefits to you, the landowner. With that in mind, please answer the following questions about hypothetical land management programs created to improve the provision of ecosystem services.

### E1

If the program only provides **benefits to the natural environment** due to improved ecosystem service provision, what would be the lowest level of financial incentive provided to you that would make you willing to participate?

*(Please select one)*

- <sub>1</sub> No incentive or 0% of your costs covered
- <sub>2</sub> Some of your costs covered, 50% or less but greater than 0%
- <sub>3</sub> Most of your costs covered, so greater than 50% but less than 100%
- <sub>4</sub> Full compensation of your costs, 100%
- <sub>5</sub> More than full compensation of your costs, so greater than 100%
- <sub>6</sub> The threat of a fine
  
- <sub>9</sub> Don't know
- <sub>8</sub> Refused

### E2

If the program **also increased the productivity or value of your property** due to improved ecosystem service provision, what would be the lowest level of financial incentive provided to you that would make you willing to participate, using the previous incentive options?

*(Please select one)*

- <sub>1</sub> No incentive or 0% of your costs covered
- <sub>2</sub> Some of your costs covered, 50% or less but greater than 0%
- <sub>3</sub> Most of your costs covered, so greater than 50% but less than 100%
- <sub>4</sub> Full compensation of your costs, 100%
- <sub>5</sub> More than full compensation of your costs, so greater than 100%
- <sub>6</sub> The threat of a fine
  
- <sub>9</sub> Don't know
- <sub>8</sub> Refused

### E3

If the program **also enhanced your lifestyle** through community, aesthetic or recreational value due to improved ecosystem service provision, while not providing direct economic value, what would be the lowest level of financial incentive provided to you that would make you willing to participate, using the previous incentive options?

*(Please select one)*

- <sub>1</sub> No incentive or 0% of your costs covered
- <sub>2</sub> Some of your costs covered, 50% or less but greater than 0%
- <sub>3</sub> Most of your costs covered, so greater than 50% but less than 100%
- <sub>4</sub> Full compensation of your costs, 100%
- <sub>5</sub> More than full compensation of your costs, so greater than 100%
- <sub>6</sub> The threat of a fine
  
- <sub>9</sub> Don't know
- <sub>8</sub> Refused

**E4**

If the program also **increased the economic value of your land and enhanced your lifestyle** due to improved ecosystem service provision, what would be the lowest level of financial incentive provided to you that would make you willing to participate, using the previous incentive options?

*(Please select one)*

- <sub>1</sub> No incentive or 0% of your costs covered
- <sub>2</sub> Some of your costs covered, 50% or less but greater than 0%
- <sub>3</sub> Most of your costs covered, so greater than 50% but less than 100%
- <sub>4</sub> Full compensation of your costs, 100%
- <sub>5</sub> More than full compensation of your costs, so greater than 100%
- <sub>6</sub> The threat of a fine
  
- <sub>9</sub> Don't know
- <sub>8</sub> Refused

**F1**

Thank you - We have almost completed the survey. The final set of questions is about yourself and your land.

DO NOT READ - Record Gender

*(Please select one)*

- <sub>1</sub> Male
- <sub>2</sub> Female

**F2**

In what year were you born?

\_\_\_\_\_

- <sub>8</sub> Refused

**F3**

What is your marital status?

*(Please select one)*

- <sub>1</sub> Single and never married
- <sub>2</sub> Legally married
- <sub>3</sub> Common-law
- <sub>4</sub> Separated
- <sub>5</sub> Divorced
- <sub>6</sub> Widowed
  
- <sub>8</sub> Refused

**F4**

How many children do you have?

\_\_\_\_\_

- <sub>8</sub> Refused

**F5**

In what year did you finish your highest level of schooling?

\_\_\_\_\_

- <sub>8</sub> Refused

**F6**

What type of certificate, diploma or degree did you receive?

*(Please select one)*

- <sub>1</sub> No certificate, diploma or degree
- <sub>2</sub> Secondary (high school) diploma or equivalency certificate
- <sub>3</sub> College or other non-university certificate diploma (including apprenticeship or trade)
- <sub>4</sub> University Bachelor's Degree
- <sub>5</sub> University Master's or Doctorate degree
  
- <sub>8</sub> Refused

**F7**

What is your approximate net annual household income?

\$ \_\_\_\_\_

- <sub>8</sub> Refused

**F8**

How much of your net income is derived from the use of your land?

*(Please select one)*

- <sub>1</sub> 0 to less than 25%

- 2 25% to less than 50%
- 3 50% to less than 75%
- 4 75% to less than 100%

8 Refused

**F9**

How many acres of land do you own?

\_\_\_\_\_ acres

8 Refused

**F10**

Are any of the following the primary use of your land?

*(Please select all that apply)*

- 1 Residence
- 2 Dryland farming
- 3 Irrigation within an irrigation district
- 4 Private irrigation
- 5 Specialty crops
- 6 Beef production
- 7 Poultry production
- 8 Pork production
- 9 Dairy production
- 10 Other agricultural related business
- 11 Renting to agricultural users
- 12 Personal recreation
- 13 Tourism and recreational business
- 14 Other (specify):

8 Refused

**F11**

Were you raised in a rural setting?

*(Please select one)*

- 1 Yes
- 2 No

8 Refused

**F12**

Up to and including yourself, how many generations has your land been in your family?

\_\_\_\_\_

8 Refused

**F13**

Do you expect your land to remain in your family for the next generation?

*(Please select one)*

- <sub>1</sub> Yes
- <sub>2</sub> No
- <sub>3</sub> Maybe
  
- <sub>8</sub> Refused

**F14**

On a political scale of left to right wing, would you consider yourself to be:

*(Please select one)*

- <sub>1</sub> Right wing (more conservative)
- <sub>2</sub> Centrist (moderate)
- <sub>3</sub> Left wing (more liberal)
  
- <sub>8</sub> Refused

**End**

Alright, thank you for your time. That concludes the questionnaire. Your participation is much appreciated, and a short report summarizing the results of the survey will be published on the internet at [www.waterresearch.net](http://www.waterresearch.net) in advance of the final results being published as part of a Master's Thesis as well as in professional and academic journals. But again, your responses will be kept strictly confidential and you will remain anonymous. Unless you have any further questions I would like to thank you again and wish you a good day/evening.

Status Code: -1