

Securing societal benefits through increased provision of ecosystem services using incentives

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Abstract

Many water scarce regions of the world are experiencing declining water quality and degraded ecosystems. This development reduces the capacity of these systems to deliver ecosystem services (ES) such as good quality drinking water and recreational opportunities. All of these services are fundamental to maintaining the quality of life that many societies have grown accustomed to. Payments for ES have been proposed to entice landowners to participate in land management programs to increase the provision of ES. Due to the voluntary nature of these programs, it is necessary to identify the proper level of incentive needed to attract enough participants. Using data from a telephone survey of rural landowners in southern Alberta, Canada, this paper investigates the minimum financial incentive required to entice participation in such programs and examines how the recognition of environmental, lifestyle and other economic benefits influence the level of incentive required. Findings show that the greater the landowners perceive the additional benefits from participating, the smaller the financial incentive required. The most important additional benefit is increased profitability, however if environmental, lifestyle and economic benefits will all result, the lowest levels of incentives will be needed.

Keywords: payments for ecosystem services, market-based instruments, environmental land management, water quality, southern Alberta.

1 Introduction

With growing populations and economies, limited water resources are being stressed, especially in more arid regions. Governments are therefore being forced to deal with water issues related to both quantity and quality. The degradation of



aquatic ecosystems is more rapid than that of other ecosystems [1]. Freshwater is the most important resource for a secure future in all parts of the world. Canadians put freshwater as the number one resource important to Canada's future, with a 3-1 margin over oil and gas [2]. Although Canada has the third largest supply of fresh water [3], not all areas have ample supply. This disparity is evident in the Canadian province of Alberta where 80% of freshwater is located in the north while 80% of the population and most of the economic activity is in the south, which can best be described as semi-arid [4]. In the Water for Life strategy (WFL) the Government of Alberta (GoA) acknowledged the importance of limited freshwater supply to the economy and quality of life [5]. The WFL aims to achieve this through improved water use efficiency and productivity, and the reallocation of existing water licences to meet the demand from new users including the environment. To facilitate this, the 1999 Water Act introduced water trading. As such, the WFL places emphasis on the need to manage water quantity. However, it is also important to ensure adequate water quality without which the provision of Ecosystem Services (ES) will decline with potential health and economic implications.

The GoA defines ES as the 'Economic and social benefits resulting from the natural process of a healthy environment and biodiversity' [6], which tend to be under produced by private landowners because of their public good characteristics. For example, healthy riparian ecosystems do a better job at filtering contaminants from runoff than do barren land [7], but the filtration by the riparian zone in one area has downstream benefits. However, riparian zones are often removed to increase farm land, removing the services they supply. Incorporating ES provision into the management of land is necessary in order to reverse the trend of declining freshwater quality.

In the Oldman River and its tributaries, part of the South Saskatchewan River Basin, 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 [8]. 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 [8–10]. 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.

Within the WFL Action plan [11] and the Land Use Framework [6], the use of Market-Based Instruments (MBIs) has been promoted to help produce and protect ES. However, the use of MBIs is limited in the area and they are largely unknown to the landowners; their willingness to accept MBIs and participate in the programs is therefore unknown. For the instruments to be successful, the policy makers should be aware of whether or not MBIs will be accepted by the landowners and what the approximate level of incentives needed to ensure participation. Landowners may base their land management decisions on different core values. This paper explores these issues and identifies landowners with similar value orientations in order to see if different groups require different financial incentives.



2 Background

2.1 Market-based instruments

Market-based instruments are tools that shape behaviour through price signals rather than the explicit instructions of Command and Control measure which have traditionally been used for environmental protection [12]. MBIs are based on voluntary participation of landowners [13], and although most do not consist of a true market, MBIs attempt to provide a financial value to a non-market good. In general there are three types of MBIs: (1) price-based instruments such as taxes, fees or Payments for Ecosystem Services (PES), (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 [14]. Generally, MBIs aim to internalize the public benefits of the ES into the private landowner's decision making in order to increase the provision of ES.

2.2 Value orientations

Economic theory would suggest that MBIs that allow the landowner to maximize the economic benefits from their land would be the best. However, this does not take into account other benefits that landowners derive from their land and the non-economic values that influence their decision to supply ES [15]. Hence, the financial incentive required by the landowner to participate in the program is still not fully understood. We turn to the field of psychology's use of the term 'value' to help explain the landowners' participation in ES programs.

Rokeach [16] describes values as core beliefs that transcend all objects and situations and represent ideal modes of conduct and end goals. People have only a few dozen values that influence their life and some are more influential than others, giving people value orientations. Value orientations can vary from person to person because values are influenced by the different interactions they have with people and their surroundings. Some landowners may have a value orientation related to profit maximizing while others may value lifestyle and the environment. Landowners who have similar value orientations are likely to think similarly and respond to MBIs in the same way. Research into grouping farmers based on their value orientation toward environmental issue has been conducted in Australia. Maybery *et al.* [17] identified three value orientations: economics, conservation, and lifestyle. Similarly, Kuehne *et al.* [18] also identified three value orientations towards water trading: investors, who were profit oriented; lifestyle, who were lifestyle oriented; and providers, who were family succession oriented. Landowners in Alberta are likely to fall within similar value orientations which could aid the understanding of their decision making.



3 Methods

3.1 Study area

The study area contained two rural municipalities within the Oldman River Basin (ORB) the Municipal District of Willow Creek and The County of Lethbridge. They are thus sharing similar water issues and watershed authority (the Oldman Watershed Council). A number of water quality studies have been conducted in the area [7, 19–24], so water quality issues are fairly well known. The span of the two municipalities provides a great variety of landowners. The western edge of Willow Creek is in the foothills of the Rocky Mountains where ranching and dry land farming is most prevalent. The eastern part of Lethbridge County contains the most intensive agriculture and highest concentration of intensive livestock operations in Canada [8]. The county also contains the City of Lethbridge, which is the largest urban area within the ORB attracting non-producing landowners. According to the 2006 Canadian Census there are 4,762 rural dwellings in the study area, which represents our target population [25, 26].

3.2 Survey

A survey instrument was created to elicit the minimum financial incentives that landowners require to participate in MBIs for the provision of ES, their values and attitudes towards participating, and socio-demographic and property characteristic. In addition to the literature, the wording and content of individual questions was guided by personal interviews with eight local landowners and a rural extension specialist. The questionnaire was then tested for comprehension and interview length before being implemented using computer-assisted phone interviews. There were 4845 phone numbers called, and from the 1677 eligible households reached, there was a 20.9% response rate providing 350 interviews.

3.3 Variables

Two sets of questions were analysed: i) the scenario based environmental land management program questions (table 1); and ii) value questions designed to identify landowners' value orientations (table 2). The first set presented four scenarios providing different benefits gained from implementing the programs. Scenario 1 is the base line scenario, where the only benefits are those to the environment. Scenario 2 identifies that, in addition to the environmental benefits, implementing the program will also increase the landowner's lifestyle benefits. Scenario 3 identifies that economic benefits can be gained in addition to the environmental benefits. Finally, Scenario 4 suggests that environmental, lifestyle and economic benefits will be gained. Landowners were then asked what financial incentive they would require to implement the program measured as a percentage of the cost of implementation. The 'threat of a fine' was removed from the analysis for this paper as only a few respondents chose it.

For the twelve value statements, landowners were required to respond using a Likert scale of agreement from one to seven, with one being 'strongly disagree'



Table 1: MBI program scenarios survey questions.

Intro	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:
Scenario 1	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?
Scenario 2	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?*
Scenario 3	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?*
Scenario 4	If the program also increased the economic value of your land <i>and</i> 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?
Answer	a) No incentive or 0% of your costs covered b) Some of your costs covered, so 50% or less but greater than 0% c) Most of your costs covered, so greater than 50% but less than 100% d) Full compensation of your costs, 100% e) More than full compensation of your costs, so greater than 100% f) The threat of a fine
* In interviews Scenario 3 was asked prior to Scenario 2.	

Table 2: Value orientation survey questions.

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



and seven 'strongly agree' (table 2). The three value comparison statements were used to cluster the respondents according to their value orientation, and the other nine value statements were used to describe the clusters. In addition, the descriptive information gathered about the respondents was used to help describe the landowners within each value orientation cluster.

3.4 Analysis

The analysis contained two steps: i) cluster respondents with similar value orientations; and ii) compare the financial incentives requested for each scenario across clusters. Using the three comparative value questions, multiple hierarchical cluster analyses were performed to create three value orientations. Crosstabs and Chi-square tests were conducted to see if the level of incentives requested varied significantly across scenarios and value orientations. ANOVA and the Tukey Post Hoc test was conducted to identify whether the means of the incentives requested were equal across the scenarios and value orientations, as well as the interaction between the scenarios and value orientations (table 3).

4 Results

4.1 Clusters

The first value orientation cluster contains over half of the sample (table 3). It: i) had the highest level of agreement with the statement that economic factors outweigh lifestyle considerations when making land management decisions; ii) tended to agree that economic factors outweigh environmental concerns; and iii) had the highest level of agreement with the statement that environmental concerns outweighed lifestyle considerations. These findings suggest that cluster members are economically focused, but environmentally concerned.

The second cluster was the smallest and had: i) the highest level of agreement that economic factors outweighing environmental considerations; ii) disagreed with the statement that environmental concerns outweigh lifestyle considerations; and iii) agreed that economic factors outweighing lifestyle considerations, although to a lesser extent than the first cluster. This suggests that overall the group is economically oriented and not overly concerned about the environment.

The third cluster was slightly larger than the second. It disagreed with the two statements valuing economic considerations over environmental and lifestyle considerations. It disagreed slightly more with the economic over environmental 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. The mean responses by this group show that it is environmental and lifestyle oriented when making land management decisions.

The ANOVA test comparing the means of the value comparison statements was significant and the post hoc Tukey test showed that the mean for each cluster was significantly different. This is expected as these statements were the

Table 3: Value orientation clusters and ANOVAs with value statements.

Question	Cluster (I)	N	M	S.D.	ANOVA F	Tukey Post Hoc Mean Difference (I - J)		
						1 Econ/ Envi (J)	2 Econ (J)	3 Envi/ Life (J)
Value Comp. 1 (Econ. vs. Life.)	1 Econ/Envi	187	5.43	1.00	245.22***	-	0.33*	2.97***
	2 Econ	75	5.11	1.03		-	-	2.64***
	3 Envi/Life	88	2.47	1.19		-	-	-
Value Comp. 2 (Econ. vs. Envi.)	1 Econ/Envi	187	4.48	1.24	148.31***	-	-0.74***	2.23***
	2 Econ	75	5.21	1.14		-	-	2.96***
	3 Envi/Life	88	2.25	1.13		-	-	-
Value Comp. 3 (Envi. vs. Life.)	1 Econ/Envi	187	5.19	0.91	94.79***	-	2.04***	0.88***
	2 Econ	75	3.15	1.02		-	-	-1.16***
	3 Envi/Life	88	4.31	1.47		-	-	-
Econ. Value 1 (Financial return)	1 Econ/Envi	187	4.63	1.96	34.45***	-	0.12	2.02***
	2 Econ	75	4.51	2.00		-	-	1.89***
	3 Envi/Life	88	2.61	1.84		-	-	-
Econ. Value 2 (Asset value)	1 Econ/Envi	187	5.88	1.26	7.65***	-	0.20	0.69***
	2 Econ	75	5.68	1.38		-	-	0.49*
	3 Envi/Life	88	5.19	1.56		-	-	-
Econ. Value 3 (Business invest.)	1 Econ/Envi	187	4.98	1.85	34.40***	-	0.31	2.01***
	2 Econ	75	4.67	1.98		-	-	1.70***
	3 Envi/Life	88	2.97	1.95		-	-	-
Envi. Value 1 (Envi. Manage.)	1 Econ/Envi	187	6.06	1.04	9.08***	-	0.61***	-0.06
	2 Econ	75	5.45	1.35		-	-	-0.67***
	3 Envi/Life	88	6.13	1.15		-	-	-
Envi. Value 2 (Rights Balanced)	1 Econ/Envi	187	5.61	1.32	6.23***	-	0.72***	0.11
	2 Econ	75	4.89	1.74		-	-	-0.61**
	3 Envi/Life	88	5.50	1.64		-	-	-
Envi. Value 3 (Better condition)	1 Econ/Envi	187	6.65	0.65	4.76***	-	0.32***	0.16
	2 Econ	75	6.33	0.88		-	-	-0.16
	3 Envi/Life	88	6.49	0.94		-	-	-
Life. Value 1 (Lifestyle)	1 Econ/Envi	187	6.61	0.88	2.79*	-	0.18	-0.13
	2 Econ	75	6.43	0.98		-	-	-0.31**
	3 Envi/Life	88	6.74	0.60		-	-	-
Life. Value 2 (Better than urban)	1 Econ/Envi	187	6.76	0.58	5.74***	-	0.29***	-0.04
	2 Econ	75	6.47	1.06		-	-	-0.33***
	3 Envi/Life	88	6.80	0.51		-	-	-
Life. Value 3 (Community)	1 Econ/Envi	187	6.74	0.55	2.50*	-	0.18*	0.12
	2 Econ	75	6.56	0.66		-	-	-0.07
	3 Envi/Life	88	6.63	0.81		-	-	-

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

basis for the cluster analysis. Examining the results from the tests of the nine value statements will provide more insight into the clusters' value orientations.

The test results for all value statements have F-statistics that are significant. The post hoc Tukey tests show which means are statistically different. The economically oriented, environmentally conscious group (cluster 1), has the highest mean agreement with all economic value statements, although the means of cluster 2 are not statistically different. Cluster 3, the environmental and lifestyle oriented group disagrees with the first and third economic value statements about using the land to maximize financial return and considering it as first and foremost a business investment. However, they agree with the importance of increasing the asset value of their land. For each of these statements cluster three was significantly different. For the environmental statements, clusters 1 and 3 are not significantly different, scoring means of high

agreement with cluster two agreeing significantly less. For the lifestyle statements most landowner agreed strongly so there was not much variation. However, there were some significant differences between cluster means, either between cluster 2 and 1, cluster 2 and 3 or both. These results confirm that the clusters from first to third can be identified as economic/environmental oriented, solely economic oriented and environmental/lifestyle oriented.

Examining the socio-demographic variables few differences between the Economic/Environmental and Economic clusters were identified. Most differences are with the Environmental/Lifestyle cluster. None of the clusters differed significantly in mean age, marital status, number of children, or annual household income. However the three clusters differed significantly with respect to sex (females: 1 = 32%, 2 = 21%, and 3 = 41%), university education (1 = 11%, 2 = 22%, 3 = 35%), urban upbringing (1 = 14%, 2 = 8%, 3 = 30%), recreational land use (1 = 49%, 2 = 45%, 3 = 71%), and having some form of agricultural land use (1 = 89%, 2 = 89%, 3 = 74%), which can be broken down into having some type of crop (1 = 68%, 2 = 76%, 3 = 58%), and some type of livestock (1 = 64%, 2 = 68%, 3 = 52%). Additionally, the income derived from the use of the land was statistically different. For cluster 1: 41% generated between 0% and 25%, 13% between 25% and 50%, 11% between 50% and 75%, and 35% between 75% and 100%. For cluster 2 the distribution was 38%, 12%, 11% and 38%, but the real difference was with cluster 3 with 76%, 6%, 2% and 16%. Finally, the tests showed that cluster 3 owned fewer acres and the land had been owned by the family for fewer generations.

4.2 Differences in incentives between scenarios

4.2.1 Crosstab

The analyses show that the level of benefit varies significantly across scenarios, confirming the hypothesis (table 4). There is an increase in the number of people willing to participate with lower financial incentives as additional benefits from implementing the program, in addition the environmental, can be proven.

Table 4: Incentive response crosstab with benefit scenarios.

Scenario	N	Financial incentives relative to cost (distributions in % of N)					Total (%)
		0%	Between 0-50%	Between 50-100%	100%	Over 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
Total	1264	20	40	28	11	2	100
Pearson Chi-Square = 70.3***							

4.2.2 ANOVA and Tukey

The results show that the variance of the means for each scenario is significantly different (table 5). This confirms the finding from the crosstab and in addition shows that the mean incentive required for: i) scenario 1 is significantly greater than all other scenarios; ii) scenario 4 is significantly lower than all other



Table 5: Complete incentive response ANOVA with benefit scenarios.

Scenario (I)	N	Mean	S.D.	ANOVA	Tukey Post Hoc Mean Difference (I-J)			
				F	Scen. 1 (J)	Scen. 2 (J)	Scen. 3 (J)	Scen. 4 (J)
1	316	56.57	35.16	18.38***	-	11.39***	15.82***	22.07***
2	316	45.17	36.44			-	4.43	10.68***
3	316	40.74	33.80				-	6.25*
4	316	34.49	33.17					-

scenarios; and ii) scenario 3, with its addition of economic benefits, has a lower mean incentive requested than Scenario 2, with its additional lifestyle benefits, however, the two means are not significantly different.

4.3 Differences in incentives between clusters

4.3.1 Crosstab

Analysing the financial incentives requested across the value orientation clusters (table 6), the distribution is significantly different: i) cluster 3 is significantly more willing to accept no financial incentive; ii) cluster 2 is less willing to accept low financial incentives; and ii) cluster 1 is more willing to accept a small incentive between 0% and 50% of costs than Cluster 2 but are the least willing to accept no incentive.

Table 6: Complete incentive response crosstab with value orientation clusters.

Cluster	N	Financial incentives relative to cost (distributions in % of N)					Total (%)
		0%	Between 0-50%	Between 50-100%	100%	Over 100%	
1 Econ/Envi	672	15	44	29	10	2	100
2 Econ	272	17	32	31	17	4	100
3 Envi/Life	320	32	36	22	9	0	100
Total	1264	20	39	28	11	2	100
Pearson Chi-square = 66.43***							

4.3.1 ANOVA and Tukey

The ANOVA analyses are in agreement with the findings of the Chi-square tests (table 7). The mean incentives requested by the three clusters are significantly different, with cluster 2 requesting the largest financial incentive, cluster 1 in the middle, and Cluster 3 requesting the lowest financial incentive.

Table 7: Complete incentive response ANOVA with value orientation clusters.

Cluster (I)	N	Mean	S.D.	ANOVA	Tukey Post Hoc Mean Difference (I-J)		
				F	1 Econ/Envi (J)	2 Econ (J)	3 Envi/Life (J)
1 Econ/Envi	672	45.31	34.100	19.92***	-	-7.17**	10.31***
2 Econ	272	52.48	37.885			-	17.48***
3 Envi/Life	320	35.00	34.537				-



4.4 Differences in incentives between scenarios and clusters

ANOVA was also used to test the interaction between the scenarios and the clusters with respect to the required level of incentive. The F statistic was 0.56 and not all significant. That is, the financial incentive requested by the landowners for each scenario did not differ across all value clusters (table 8).

4.3.2 Scenario Crosstabs

The distributions of the financial incentive requested when broken down into each scenario and value clusters (Table 8) shows the significant differences. Scenarios 1 and 3 have similar distributions among the three value clusters while the value clusters in Scenarios 2 and 4 are significantly different. Comparing the distributions of the financial incentives requested by each value clusters identifies a consistent trend among all scenarios. Cluster 3 is most willing to accept no or low financial incentives. Cluster 2 has members requiring higher financial incentives than the other clusters, but it also has a higher willingness to accept no financial incentives than Cluster 1. Cluster 1 has a higher willingness to accept low financial incentives than Cluster 2, 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 0% incentive.

Table 8: Incentives crosstabs with value orientation clusters by benefit scenario.

Scen.	Clusters	N	Financial incentives relative to cost (distributions in % of N)					Total (%)
			0%	Between 0-50%	Between 50-100%	100%	Over 100%	
1	1 Econ/Envi	168	7	32	42	15	4	100
	2 Econ	68	10	28	39	19	6	100
	3 Envi/Life	80	18	36	33	14	0	100
	Total	316	10	32	38	16	3	100
2***	1 Econ/Envi	168	13	48	24	12	3	100
	2 Econ	68	13	28	35	22	1	100
	3 Envi/Life	80	39	30	23	8	1	100
	Total	316	20	39	26	13	2	100
3	1 Econ/Envi	168	17	46	29	7	1	100
	2 Econ	68	18	38	26	15	3	100
	3 Envi/Life	80	29	43	20	9	0	100
	Total	316	20	44	26	9	1	100
4***	1 Econ/Envi	168	22	49	23	6	0	100
	2 Econ	68	26	32	26	10	4	100
	3 Envi/Life	80	44	38	13	6	0	100
	Total	316	28	43	21	7	1	100

4.3.3 Scenario ANOVAs and Tukey

All scenarios proved to be significantly different when comparing the means of the value clusters (table 9); however, scenarios 1 and 3 are significant at 0.05 and 0.10 level, respectively, compared to the 0.01 level of the other two. The mean financial incentives requested by the three groups, shows the same ranking in all scenarios; The mean incentive requested by cluster 3 is the lowest, followed by cluster 1, and the highest by cluster 2. The Tukey post hoc test, however, shows



that the means of clusters 1 and 2 are not always significantly different. Only in Scenario 2 are all the clusters significantly different and in Scenario 3 only Clusters 2 and 3 are significantly different.

Table 9: crosstabs with value orientation clusters by benefit scenario.

Scenario	Cluster (I)	N	Mean	S.D.	ANOVA	Tukey Post Hoc Mean Difference (I-J)		
					F	1 Econ/ Envi (J)	2 Econ (J)	3 Envi/ Life (J)
1	1 Econ/Envi	168	59.23	33.90	3.95**	-	-1.80	12.04**
	2 Econ	68	61.03	37.00			-	13.84**
	3 Envi/Life	80	47.19	34.90				-
2	1 Econ/Envi	187	45.83	35.11	8.35***	-	-11.52*	12.40**
	2 Econ	75	57.35	36.41			-	23.92***
	3 Envi/Life	88	33.44	36.01				-
3	1 Econ/Envi	187	40.92	32.19	2.94*	-	-6.87	6.55
	2 Econ	75	47.79	37.34			-	13.42**
	3 Envi/Life	88	34.38	33.13				-
4	1 Econ/Envi	187	35.27	30.63	6.17***	-	-8.48	10.27*
	2 Econ	75	43.75	38.96			-	18.75***
	3 Envi/Life	88	25.00	30.81				-

5 Summary

The willingness to participate in land management programs designed to produce and protect ES differs depending on which benefits the landowner understands the program will produce in addition to environmental. When only the environmental benefits are understood by the landowner, they request a higher financial incentive than if lifestyle and economic benefits are seen as well. Although economic benefits, in addition to environmental, on average enticed lower financial incentives than lifestyle benefits, the difference generally is not significant. However, the addition of both economic land lifestyle benefits to the environmental creates a significant reduction in the financial incentives requested by the landowners. This implies that when promoting land management programs to landowners for ES provision it is important to document economic and lifestyle benefits as well. The additional benefits the landowners see in participating justify some of the extra cost they may incur when implementing the program.

Landowners in the area of southern Alberta can be broken down into three groups according to value orientations. The largest group, with more than half the sample, represented an Economic/Environmental value orientation. This group has strong economic values, likely due to a high reliance on their land for generating income and being highly involved in agriculture. This characteristic is similar to the second group which represents an Economic value orientation. These two groups differ in that the first group is environmentally concerned recognising the value of healthy ecosystems in their own land management and the benefits that give their economic activity on their land. Sustainability is likely a key concept in their land management practices. The third group, however, has an Environmental/Lifestyle value orientation, likely because it has less



agricultural production and makes less of their income from the land. Therefore, their values when dealing with land management can be more focused on protecting the environment and the lifestyle their land gives them. In general, the economic value was important for the first two groups, but not for the third, and the environmental value was important for the first and third groups, whereas the lifestyle value was important for all groups.

Of the three groups, the Environmental/Lifestyle was most willing to accept no or little financial incentive to participate, the Economic/Environmental group would be willing to participate if a small financial incentive was provided, and the Economic would be generally least willing. When the benefits in the scenarios increased, the incentive levels for all groups decreased and the differences between the groups remained relatively constant. With the Economic/Environmental and Economic groups representing about three quarters of the sample, however, policy makers should be able to expect that southern Albertan landowners are not likely to participate in environmental land management programs for free. Although, when the landowners see the additional benefits of participating, they are willing to accept greater portions of the cost.

Identifying the value orientations of landowners in relation to their land management practices proves to be useful in understanding how the landowners will respond to MBIs. Those that have greater agricultural ties to their land and derive a greater income from it are more likely to have an economic value orientation. From this analysis, though, it is unclear what the factors are causing landowners to be environmentally conscious in their management practices. However, knowing the proportion of the landowners with different value orientations and how they respond to different benefits in MBIs should go a long way in producing acceptable environmental policy instruments.

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