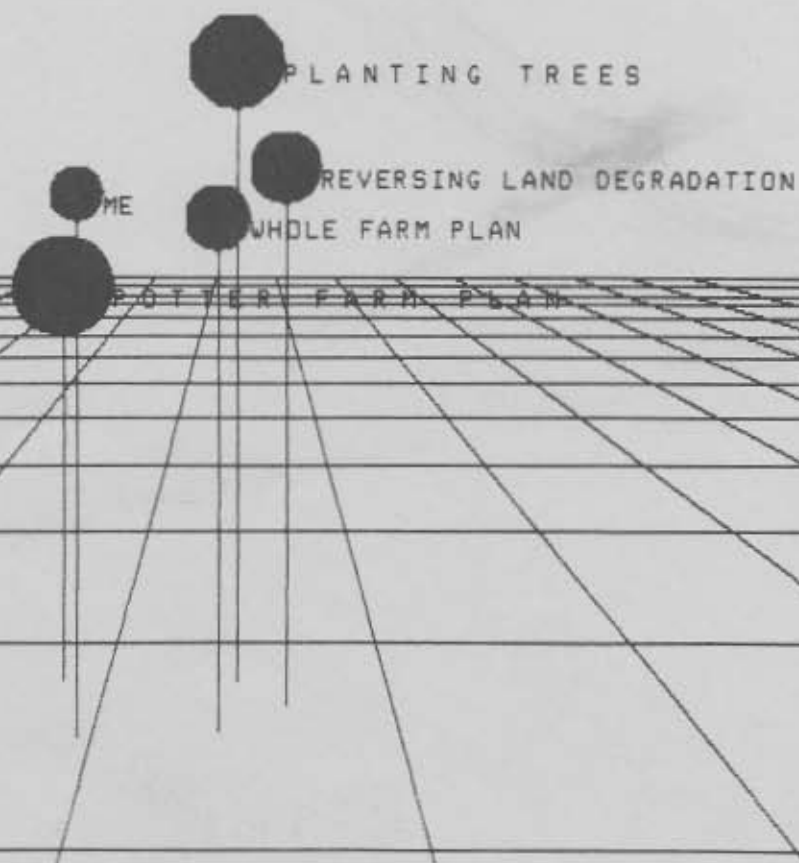FARMERS' ATTITUDES TOWARDS LAND MANAGEMENT FOR CONSERVATION

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PLANTING TREES

REVERSING LAND DEGRADATION

WHOLE FARM PLAN

POTTER FARM PLAN

CONTENTS

FARMERS' ATTITUDES TOWARDS LAND MANAGEMENT FOR CONSERVATION

1. INTRODUCTION

Land degradation has been a problem in Victoria for many years. Early settlers caused major soil erosion problems by exploiting land unsuited to cropping, and by ploughing up and down steep slopes. The former Soil Conservation Authority (now the Land Protection Service of the Ministry of Conservation, Forests and Lands (CF&L)) played a major role in tackling these problems of soil erosion. However, in the meantime new problems have emerged, particularly that of salinity.

The Potter Foundation, through the Potter Farmland Plan (PFP), has accepted the challenge of introducing practical measures to enable farmers to sustain productivity. With administrative assistance from CF&L, the PFP has concentrated financial assistance and extension effort in a relatively small area in the initial stages. Depending on results, it was then intended to expand the process of promoting better land management.

This study was commissioned by the Potter Foundation and the Land Protection Service of CF&L to provide baseline information about farmers' attitudes towards a number of issues associated with land degradation and control measures in general, and the PFP specifically.

2. OBJECTIVES OF STUDY

This study had several complementary objectives. The first objective was to establish a base line assessment of the attitudes of participants in the Potter Farmland Plan (PFP) toward aspects of the PFP. More specifically the purpose was to establish the attitudes of PFP farmers towards the ends and means embraced in the PFP strategy concept, and to establish a baseline against which to monitor these attitudes and to identify any change in attitudes over time.

Secondly, information was to be gathered to allow some assessment of the success of the demonstration farms in achieving local change by the "over the fence" and other processes.

In order to develop extension approaches to promote the uptake of land management systems which reduce land degradation, research was directed towards a third objective: the identification of the key factors which would promote improved land management by farmers.
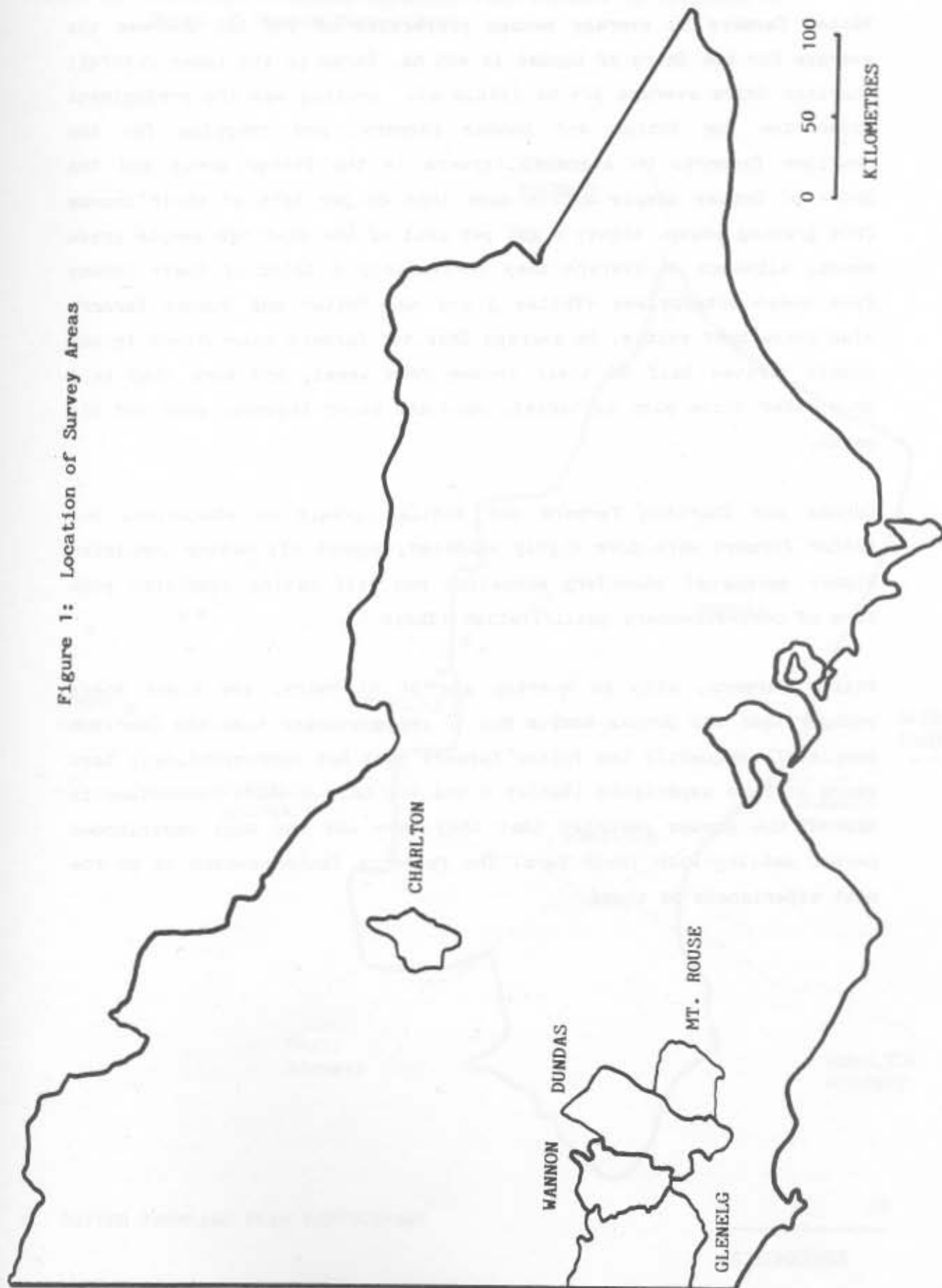
A fourth, more general, objective of the study was to investigate farmers' perceptions of the place of trees in farm planning.

3. METHODOLOGY

The field survey interviewing for the study was undertaken in three phases, representing two areas of Victoria; a south-western grazing region and a central cropping region (Figure 1). Sixteen farmers managing the 15 farms involved in the Potter Farmland Plan (PFP) were interviewed on their farms in the first phase (Figure 2). In the second phase a random sample of 41 farmers managing properties larger than 200 ha was drawn from the Shire of Dundas ratepayers' roll (Table 1). These also were interviewed on their properties, where possible in the presence of their spouse. Dundas farmers represent 'neighbourhood farmers' for some Potter participants. Hence their knowledge of, beliefs about and attitudes towards the PFP could indicate the success of the demonstration farms in spreading the messages about whole farm planning and control of land degradation.

The third phase of the project was conducted with a random sample of 41 farmers drawn from ratepayers in the West and South Ridings of the Shire of Charlton in the Wimmera. These Ridings are representative of cropping land in the district. Hobby and part-time farmers were excluded from the sample. Additional questions related to trees and tree planting were added to the second and third phases of the study.

Figure 1: Location of Survey Areas

4. CHARACTERISTICS OF THE SURVEY GROUPS

Potter farmers on average manage properties of 950 ha, whereas the average for the Shire of Dundas is 465 ha. Farms in the lower rainfall Charlton Shire average 924 ha (Table 2). Grazing was the predominant enterprise for Potter and Dundas farmers, and cropping for the Charlton farmers. On average, farmers in the Potter group and the Shire of Dundas sample derive more than 80 per cent of their income from grazing sheep. Eighty eight per cent of the Charlton sample graze sheep, although on average they derive only a third of their income from sheep enterprises (Tables 3 and 4). Potter and Dundas farmers also graze beef cattle. On average Charlton farmers interviewed in our sample derived half of their income from wheat, and more than half grow other crops such as barley, peas and other legumes, oats and oil seeds.

Dundas and Charlton farmers had similar levels of education, but Potter farmers were more highly educated, almost all having completed higher levels of secondary education and half having completed some form of post-secondary qualification (Table 5).

Potter farmers, with an average age of 41 years, are eight years younger than the Dundas sample and 12 years younger than the Charlton sample. Consequently the Potter farmers have had correspondingly less years of farm experience (Tables 6 and 7). Only a small percentage in any of the groups reported that they were not the most experienced person dealing with their farm. The farmer's father tended to be the most experienced of these.

Figure 2: Location of Potter Farmland Plan Farmers in Relation to Shire of Dundas Survey Area

HENTY
HIGHWAY

SHIRE OF
DUNDAS

WANDO
VALE

MELVILLE
FOREST

GLEN
THOMPSON

GLENELG
HIGHWAY

GLENELG
HIGHWAY

HAMILTON

HENTY
HIGHWAY

HAMILTON
HIGHWAY

● POTTER FARMLAND PLAN PARTICIPANT

0   10   20

KILOMETRES

Table 1: Survey Population Characteristics of the Shires of Dundas and Charlton[1]

	DUNDAS	CHARLTON[2]
Number of agricultural establishments	653	168
Average area of establishment (ha)	534	700
Total shire population	3478	2063
Sample size	41	41

1 ABS Cat. No. 7411.2 (1984-85).
2 Figures quoted in table are for entire shire, however, in the Charlton shire only the West and South Ridings were sampled.

Table 2: Average Farm Size (in ha) by District

AREA (in ha)	POTTER (N=16)	DUNDAS (N=41)	CHARLTON (N=41)
0 - 200	-	6	1
201 - 500	3	20	7
501 - 1000	o	12	17
1001 - 3000	5	3	16
Average	950	465	924

Table 3:   Percentage of farmers undertaking each enterprise

ENTERPRISE	POTTER (N=16)	DUNDAS (N=41)	CHARLTON (N=41)
Sheep	100	100	88
Cattle	69	54	7
Dairy	-	2	-
Crops	63	37	100
Other	-	7	20

Table 4:   Percent of Income on Average Received from Different
Enterprises

ENTERPRISE	POTTER	N	DUNDAS	N	CHARLTON	N
Sheep (%)	86.5[1]	(16)	81.0	(41)	34.0	(36)
Beef (%)	15.3	(10)	22.9	(22)	10.0	(1)
Crops (%)	12.6	(5)	18.1	(10)	51.4	(41)

1 percentages do not sum to 100% because they are average incomes

Table 5:   Education Level of Farmers

LEVEL	POTTER	DUNDAS	CHARLTON
Up to year 9	1	21	23
Years 10 to 12	7	16	15
Post-secondary	8	4	3
Total	16	41	41

Table 6:   Age of Farmers

AGE (in years)	POTTER (N=16)	DUNDAS (N=41)	CHARLTON (N=41)
Up to 40	8	11	8
41 - 60	8	20	20
61+	-	10	13
Average	41	49	53

5. SOIL CONSERVATION AND LAND DEGRADATION

ALL PPP farmers (Potter farmers) indicated they had some form of land degradation on their properties. This is hardly surprising as it was one of the criteria for selection. Soil salting, gully erosion and pasture decline are the main forms of degradation identified by PPP farmers. Approximately half the farmers of the Shire of Dundas identified land problems on their properties, the major one being soil salting. Gully and sheet erosion were nominated as the principal problems for approximately three quarters of Charlton farmers. The differences between Shires reflect differing land uses and weather patterns (Table 8).

Potter farmers historically have been most active in conservation activities, more so than Charlton farmers and considerably more so than Dundas farmers (Table 9). However, at least one third of those from all groups who claimed to have undertaken such work said they had first done so at least 20 years ago.

Tree planting was the main soil conservation activity undertaken by Potter and Dundas farmers, with attention also paid to pasture improvement and fencing off eroded or degraded areas (Table 10). Soil salting and gully erosion were nominated as the predominant land degradation problems, while provision of shade and shelter were given as the principal reasons for undertaking soil conservation work (Table 11). Improvement of the landscape by control of gully erosion, creek scouring and salting which leads to pasture decline were also cited as important reasons.

Charlton farmers have a different set of land degradation problems which reflect their different climatic conditions and farming methods. Heavy cropping leads to sheet erosion and soil drift. Their main concern is to decrease wind and water erosion by constructing banks, ploughing on the contour, grassing gullies and waterways, filling in gullies and improving drainage (Tables 8, 10 and 11).

Table 7: Farmer's Years of Experience

YEARS	POTTER (N=16)	DUNDAS (N=41)	CHARLTON (N=41)
0 - 10	3	6	2
11 - 20	4	9	5
21 - 30	8	4	10
31 - 40	1	15	13
40+	-	7	11
Average	21	28	34

Table 8: Land Degradation (number of mentions)

TYPE OF LAND DEGRADATION	POTTER (N=16) 100%	DUNDAS (N=20) 49%	CHARLTON (N=30) 73%
Gully erosion	11	2	18
Wind erosion	2	1	7
Sheet erosion	1	4	10
Soil salting	15	19	5
Trees/pasture dying	5	1	3
Land slips	3	1	-
Other[1]	1	1	3

1 springs, acid soils, over cultivation and flood washes

Table 9: Timing of First Soil Conservation Work

DATE (years ago)	POTTER	DUNDAS	CHARLTON
0 - 5	2	8	3
6 - 10	3	1	5
11 - 15	1	1	4
16 - 20	1	1	6
20+	7	6	13
Not stated	-	4	-
Never	2	20	10
Total	16	41	41

Table 10: Soil Conservation Activities (number of mentions)

TYPE	POTTER (N=14) 88%	DUNDAS (N=20) 49%	CHARLTON (N=31) 76%
Fenced off eroded areas	4	2	1
Fenced off salted areas	3	1	-
Improved Pasture	4	3	1
Planted trees	10	14	3
Filled in gullies	1	-	12
Constructed banks	3	-	19
Improved drainage	1	-	6
Contour ploughing	1	-	13
Grassed gullies, waterways	1	1	12
Ripped patches of land	-	-	4
Improved soil structure	-	-	3
Other [1]	1	1	4

[1] left trees when clearing, cleared rabbits, concrete gully heads, cropping rotations and fenced off waterways

Table 11: Reasons For Soil Conservation Work

REASON	POTTER (N=14) 88%	DUNDAS (N=20) 49%	CHARLTON (N=31) 77%
Gully eroded, creek scoured	6	4	15
Sheet erosion cropped out padd.	-	-	17
Improve the landscape	4	3	-
Bare patches, salting	3	5	-
Halt degradation	6	3	3
Improve productivity	2	1	3
Shade and shelter	-	6	1
Control water table	1	1	-
Tree deaths, decline	1	1	-
Love of trees	1	1	-
Wind erosion, soil drift	-	-	5
Gutters	-	-	3
Drainage	-	-	4
Other [1]	1	4	2

1 compatible with necessary subdivisions, increase the value of the farm, firewood, replace trees, rabbit infestation, long term economic aspect and for the future

6. TREE PLANTING AND LAND MANAGEMENT

All the Potter farmers had planted trees at some stage, whereas four of the Dundas Shire farmers and one from Charlton had never planted trees on their properties (Table 12). More than a third of those who had planted trees, first planted these trees more than 20 years ago, mostly for shelter belts around houses and sheds. A significant proportion also planted trees for the first time during the past five years.

Shade and shelter were given as the main reasons for planting trees initially, although another common response was for aesthetic aspects of landscape improvement (Table 13). Several farmers in the Hamilton district first planted trees to reduce the effects of or to control salinity, and to replace dead trees, thus countering the decline of red gums and other eucalypt species. Provision of shade and shelter and landscape improvement continue to be major reasons given for current tree planting, although tree replacement, salinity control and concern for wildlife habitats appear to indicate increased awareness of the diverse benefits to be gained from tree planting (Table 14)

About half of the Dundas and Charlton farmers claim to feel differently about trees today than they did ten years ago. They are now more aware of the benefits to be gained from planting trees, and have a more positive attitude towards trees in general (Table 15). Dundas farmers felt that trees help to halt land degradation, whereas Charlton farmers pointed to the influence of mass media in increasing public awareness of trees (Table 16). Both groups also said they had learned to appreciate the role of stock shelter in improving productivity, and the ways in which trees provided a more pleasant environment to live in. The other half, who claimed they felt no differently, either made no further comment or said they had always been interested in trees or had enough on their farm already (Table 17).

Table 12:   Timing of Current Owner's First Planting of Trees on the
            Property

DATE (years ago)	POTTER	DUNDAS	CHARLTON
0 - 5	4	17	5
6 - 10	3	4	5
11 - 15	3	1	2
16 - 20	-	2	5
20+	6	13	23
Never	-	4	1
Total	16	41	41

Table 13:   Reasons for First Planted Trees (number of mentions)

REASON	POTTER (N=16) 100%	DUNDAS (N=37) 90%	CHARLTON (N=40) 98%
Snade and shelter	7	32	34
Improve the landscape	3	10	19
Replace trees	4	4	2
Reduce,control salinity	3	4	1
Improve productivity	1	1	-
For the future	1	3	-
Increase land values	-	2	-
Wildlife	-	2	2
Firewood, farm timber	-	2	1
Erosion worsening	4	1	-
Lower the water table	1	-	2
Other[1]	2	2	3

1 halt degradation, Potter involvement, Dept of Agric. advice, dry
areas for stock, no real reason, stablize the soil and commercial
woodlot

Table 14: Reasons for Planting Trees Currently (number of mentions)

REASON	POTTER (N=16) 100%	DUNDAS (N=37) 90%	CHARLTON (N=40) 98%
Shade and shelter	12	25	28
Improve the landscape	6	16	13
Replace trees	3	6	6
Reduce,control salinity	6	6	3
Improve productivity	2	3	-
For the future	3	4	-
Increase land values	-	2	-
Wildlife	2	6	5
Firewood, farm timber	1	2	1
Erosion worsening	3	-	1
Halt degradation	2	1	-
Lower the water table	2	-	3
Do not plant trees now	-	4	3
Attract the rain	-	-	2
Other[1]	1	1	3

1 Potter involvement, dry areas for stock, maintain the land, stablize the soil and fodder

Table 15: Reasons Why Farmers Feel Differently About Trees Currently
Compared With Ten Years Ago (number of mentions)

REASON	DUNDAS (N=23) 56%	CHARLTON (N=19) 46%
More aware of need to plant trees	21	16
More positive attitude to trees	9	4
Other[1]	4	5

1 should plant small trees with the larger trees, i.e. an understorey,
should not plant 100% natives, increased importance of natives,
through experience realized that trees give shelter, everyone should
plant trees, do not need to plant any more trees

Table 16: Why Farmers Feel Differently About Planting Trees Currently
Compared With Ten Years Ago (number of mentions)

REASON	DUNDAS (N=23) 56%	CHARLTON (N=19) 46%
Not stated	9	-
Media influence, awareness	2	9
Shelter is essential	5	6
Halt land degradation	8	-
Native birds, wildlife	2	2
Aware of need to restore nat. balance	-	2
Do not fit in with other enterprises	2	-
Improve aesthetics	1	1
Experience with winds	-	3
Attract rain	-	2
More conscious of salt	-	2
Other[1]	1	3

1 benefit future generations, influence of wife, farmer too old and
trees in paddock corners

The majority of Dundas and Charlton farmers said there were good reasons why they did not have more trees on their properties, principally because of the time and expense involved in planting and upkeep, or because they had enough already (Table 18). While Dundas farmers stressed the expense factor, Charlton farmers, and to a lesser extent those from Dundas Shire, pointed out that trees get in the way, especially with cropping, thus reducing management flexibility. Whereas only a quarter of those in Dundas Shire sow crops, all Charlton farmers engage in cropping (Table 3).

Approximately half the farmers in both Shires claimed to have planted trees this year, both as individual trees and as shade and shelter plantations (Table 19). The higher proportion of Dundas farmers reporting plantings of individual trees reflects the predominance of grazing in this Shire contrasted with the predominance of cropping in Charlton. On the other hand, Charlton farmers appear less concerned about trees as a means of salinity control or wildlife habitat and more concerned with their role in providing shelter from the prevailing winds.

Nearly three quarters of both groups claimed they would be planting trees in the coming year, mostly for shade and shelter (Table 20). They also reflected principal land use differences of the two shires by stressing individual trees in Dundas, and thickets or clusters in Charlton where plantations do not interfere with cropping practices. Other reasons similar to those for past practices were given, such as landscape improvement and tree replacement in Dundas, and erosion control, soil stabilization and run-off reduction in Charlton.

There was no relationship between a positive orientation to tree planting and age or an awareness of farm tree groups for farmers in either shire. However, farmers in both shires, who have a predisposition to tree planting tended to be more highly educated and were more likely to have identified land degradation problems on their properties.

Table 17:   Reasons Why Farmers Do Not Feel Differently About Trees Now
            Compared With Ten Years Ago (number of mentions)

REASON	DUNDAS (N=18) 44%	CHARLTON (n=22) 54%
No comment	10	10
Always interested in trees	3	5
Have enough trees on farm	2	2
Trees for shelter only	1	1
Got to have trees	-	3
Other[1]	1	1

1 did not own land 10 years ago and tried trees but species was not
suitable

Table 18:   Reason for Not Having More Trees on the Property (number of
            mentions)

REASON	DUNDAS (N=38) 93%	CHARLTON (N=33) 81%
Expense, lack of finance	21	9
Time and labour involved	13	11
Enough trees on farm already	15	13
Trees get in the way, inflex. management	6	10
Trees are hard to establish	2	4
Farmer is not getting any younger	1	1
Not first priority on farm	-	7
Trees use up water and nutrients	-	7
Other[1]	5	1

1 intend to sell property soon, new to managing role, hard on a cattle
property, they damage fences etc., dust in the wool from sheep camps,
stoney barrier in the ground, species are not suitable and need advice
and information

Table 19: Reason for and Type of Tree Planting This Year (number of mentions)

	DUNDAS (N=17) 41%	CHARLTON (N=21) 51%

TYPE OF TREE PLANTING

Individual trees	10	5
Shade and shelter plantations	8	10
Replacement plantings	3	3
Around house and sheds	-	8

REASON FOR TREE PLANTING

Shade and shelter	10	14
Improve the landscape	7	5
Replacement	5	5
Reduce, control salinity	3	1
Wildlife	2	1
Dry soil out, soak up excess water	1	1
Shade and shelter for house	-	2
Other[1]	2	1

1 improve productivity, for the future and stabilize the soil

Table 20:   Reasons for and Type of Tree Planting in the Future (number
            of mentions)

	DUNDAS (N=32) 78% nxt 6 mnths	CHARLTON (N=27) 66% nxt yr
TYPE OF TREE PLANTING		
Shade and shelter plantations	22	15
Individual trees	13	4
Replacement plantings	8	4
Around house and sheds	-	6
Thickets, clusters	1	5
Fodder trees	-	1
REASON FOR TREE PLANTING		
Shade and shelter	21	18
Improve the landscape	11	4
Replacement	6	3
Wildlife	3	3
Reduce, control salinity	3	2
Lower the water table	2	1
Stabilize the soil	-	5
Shade and shelter for the house	-	3
Prevent reduce runoff	-	3
Increase land values	2	-
Other[1]	2	2

1 improve productivity, for the future, dry soil out and fodder trees

Charlton farmers were asked whether they used minimum tillage techniques in their cropping practices. Those who indicated that they had recently used minimum tillage cultivation were significantly more likely to have a positive orientation to tree planting (chi-square 4.6, $P < 0.03$). The use of minimum tillage was not related to farmers' age, education level, awareness of farm tree groups or who considered farmers who grow trees to be conservationists.

The three advantages of trees most commonly mentioned by Dundas and Charlton farmers were for shade and shelter, landscape improvement and wildlife habitat. Farmers in both shires also noted the value of trees in providing fuel wood and construction timber, and in using soil moisture to decrease waterlogging. Dundas farmers also mentioned the role of trees in decreasing the effects of salt and improving soils and pastures. Charlton farmers, on the other hand, pointed out the advantages of trees as windbreaks, and several suggested they have other environmental uses such as attracting rain, decreasing carbon dioxide levels and restoring the balance of nature (Table 21).

Nearly one quarter of Dundas and Charlton farmers saw no disadvantages with trees, but of those who did, the most common comments were that trees make farming inflexible, they drop limbs and leaves, and they create extra work and the need for additional fencing (Table 22). Dundas farmers are more concerned than Charlton farmers about the expense of establishing and maintaining trees, perhaps because of the higher costs associated with intensive grazing in their wetter climate. For Charlton farmers, the most common disadvantage of trees was that they compete with crops and pastures for soil moisture and nutrients, and occupy potentially good cropping land. The predominance of grazing in the Dundas Shire is reflected by Dundas farmers' concern that sheep camp under trees in summer, thus getting dusty wool. Hence extension workers in these two shires would have to take account of the differing views and tailor their programmes accordingly.

Table 21: Advantages of Trees (number of mentions)

ADVANTAGES	DUNDAS (N=41)	CHARLTON (N=41)
Shade and shelter	37	36
Improve the landscape	17	19
Wildlife	16	12
Decrease salt effects	9	3
Wood, fuel	6	8
Wood, construction	5	4
Help in wet areas	4	4
Improve the soil and grass	7	2
Increase the value of the property	3	2
For the next generation	4	-
Improve stock performance	3	-
Personal satisfaction	1	1
Decrease the wind speed	-	7
Control, reduce the water table	-	4
Attract the rain	-	2
Reclaim land, erosion control	1	2
Fresher atmosphere, decrease CO2 levels	-	2
Restore the balance of nature	-	2
Other[1]	1	1

1 shelter for crops, do not see any

Table 22: Disadvantages of Trees (number of mentions)

DISADVANTAGE	DUNDAS (N=41)	CHARLTON (N=41)
None really	9	8
Use up moisture	5	18
Expense	7	4
Difficult to establish and maintain	7	2
Make farming inflexible	5	5
Trees drop limbs and leaves, extra work	6	7
Attract and harbour vermin and birds	4	2
Fencing	4	3
Take up useful land	1	11
Hazard to drains	2	1
Stock camps, dusty wool	6	-
Affect pasture growth	3	-
Fire hazard	3	-
Encourage weed growth	3	-
Time	2	-
Use up nutrients	-	11
Branches smash fences	-	6
Other[1]	2	2

1 increase the incidence of flystrike, stock damage fences, interfere
with channels and problems with non-native trees

Nearly all Dundas farmers and two thirds of Charlton farmers agreed that trees fit in with overall farm management emphasising the shade and shelter aspect (Tables 23 and 24). However, they differed somewhat in specific aspects. For example, Dundas farmers stressed the role of trees in increasing grass and stock production, whereas Charlton farmers emphasized how trees generally assist with management. Several farmers from both shires noted the capacity of trees to assist in combating land degradation, while some others indicated that trees neither fitted in with nor competed with other farm management practices. Slightly less than a quarter of farmers said that trees did create management problems (Table 25). The Charlton farmers saw trees as competitors for soil moisture and nutrients as well as getting in the way, whereas some Dundas farmers saw them diverting financial and labour resources.

The Dundas farmers are more inclined to agree to the statement that farmers who grow trees are conservationists than the Charlton farmers who were equally divided between agreeing and disagreeing to this statement (Table 26); although many farmers from both shires stated that their response depended on the definition of the word conservationist (Table 27). For both shires, there was no relationship evident between the response to the conservationist question and farmers' age, education level and the perceived presence of land degradation; however, with the Charlton farmers only, a positive orientation to tree planting was significantly related to agreement with the statement that farmers who plant trees are conservationists (chi-square 5.4, $P < 0.02$). The two most common unsolicited responses by the Charlton farmers to the conservationist question were: "do not have to be a conservationist to grow trees" and "all farmers (people) are conservationists to a certain extent" (Table 27).

Table 23: Relationship of Trees with Other Enterprises (per cent)

RELATIONSHIP	DUNDAS (N=41)	CHARLTON (N=41)
Fit in	93	61
Compete with	5	12
Neither	2	15
Both	-	10
Do not know	-	2
TOTAL	100	100

Table 24: Relationship of Trees with Overall Farm Management (number of mentions)

RELATIONSHIP	DUNDAS (N=38) 93%	CHARLTON (N=25) 61%
Snade and shelter	29	20
Increase grass and stock production	8	1
Overall management of the farm	2	7
Aesthetically	3	2
Increase the value of the property	4	1
Provide timber	2	1
Improve salt effects	3	-
Wildlife	1	1
Work done in slack times	2	-
Soil management, decrease land degradation	-	3
Other[1]	1	5
Not clearly stated	2	3

1 keep wet areas dry, attract the rain, protection for sheds, balance of nature, for the future and fresher atmosphere-decrease CO2 levels

Table 25: How Trees Compete with the Overall Management of the Farm
           (number of mentions)

REASON	DUNDAS (N=6) 15%	CHARLTON (N=10) 24%
Trees get in the way	1	4
Cost, diversion of resources	2	-
Use up water and nutrients	-	8
Other[1]	4	-
Not clearly stated	1	1

1 bare patches of land-dusty wool, increase property rates, take up
land and delay returns

Table 26: Percentage of Farmers Agreeing or Disagreeing to the
           Statement that Farmers Who Grow Trees are Conservationists

RESPONSE	DUNDAS (N=40)	CHARLTON (N=41)
strongly agree	32	20
slightly agree	22	22
neither	7	14
slightly disagree	25	17
strongly agree	12	27
TOTAL	100	100

Table 27: Frequency of Comments Made by Farmers to the Question:
Some People Think That Farmers Who Plant Trees are
Conservationists

COMMENT	DUNDAS (N=41)	CHARLTON (N=41)
No comment made	17	8
Do not have to be a conservationist to grow trees, just commonsense to improve property	9	16
All farmers (people) are conservationists to a certain extent	7	13
Depends on definition of conservationist	6	11
If conservationist=greenie, then no	10	6
Farmers are definitely conservationists	2	2
Definitely disagree	1	2

7. LANDHOLDER AWARENESS OF THE POTTER PROGRAMME AND FARM TREE GROUPS

Two thirds of the farmers interviewed in the Shire of Dundas were aware of the Potter Farmland Plan, compared with only ten per cent of those in Charlton Shire. This is hardly surprising in view of the PFP office location in Hamilton. Local people have been exposured to PFP information through the media and at field days, as well as through personal contacts. The four Charlton farmers who had heard of the PFP knew little about it, and only one mentioned its association with trees. On the other hand, Dundas farmers who were aware of the programme associated it closely with trees. The most frequent responses related to the importance of trees, including tree trials, planting trees at minimum cost to the farmer, and the integration of trees with whole farm planning. Some farmers did recognise the PFP objective is to halt land degradation, and saw the educational nature of the project as a demonstration to other farmers and the community at large. Potter farmers placed less emphasis on the role of trees in the project, seeing it as whole farm planning and prevention of land degradation (Table 28). Awareness of the PFP project did not appear to be related to the Dundas farmers' age; it was significantly related to the Dundas farmers' education level (chi-square 8.8, P 0.01). The more highly educated farmers, are more likely to be aware of the PFP project. The perceived presence of land degradation on Dundas farmers' farms or a positive orientation to tree planting was related to an awareness of the PFP project.

Farmers who claimed to have heard of the project were rather unsure about when they heard of it first (Table 29). About half of the Dundas farmers who were aware said they first heard about it less than two years ago, while the remainder said two to four years ago. Only one Charlton farmer was sure he had heard about the project one to two years earlier.

The majority of Dundas farmers who were aware of the PFP had read about it in the local newspaper, the Hamilton Spectator, or had heard of it through friends or relations (Table 30). The sole Charlton farmer who could remember his source of information said it was the Victorian Farmers' Federation.

Table 28: Understanding of Potter Farmland Plan (number of mentions)

DESCRIPTION	POTTER (N=16) 100%	DUNDAS (N=27) 66%	CHARLTON (N=4) 10%
Halt land degradation	6	8	-
Demonstration, educational	6	6	-
Trees integrated with WFP	4	8	-
Whole farm planning	7	1	-
Importance of trees, trials	1	15	1
Prevent, control land degr.	5	-	-
Ensuring long term productivity	3	-	-
Trees at minimum expense	-	8	-
Not sure, heard the name	-	2	5

Table 29: When First Heard of the Potter Farmland Plan

TIME	DUNDAS (N=27) 66%	CHARLTON (N=4) 10%
0 - 1 YEARS AGO	4	-
1 - 2 YEARS AGO	9	1
2 PLUS YEARS AGO	11	-
NOT SURE	3	3

Approximately two thirds of Dundas farmers and three quarters of Charlton farmers were aware of Farm Tree Groups (FTG). They perceived the role of FTG to be that of providing trees, labour and information on tree planting (Table 31). Dundas farmers stressed the information and promotional aspects, while Charlton farmers emphasized the function of FTG in providing trees and labour, and associated them with several reclamation projects in the area. Those who had heard of FTG and could remember when, stated they had learned of them less than two years ago, principally through newspapers and television (Tables 32 and 33). A relationship between awareness of farm tree groups and age or the perceived presence of land degradation was not observed for farmers from either shire however, farmers who were more highly educated or who were more inclined to be tree planters were more likely to be aware of FTG.

6. PERCEPTIONS OF THE PFP BY PARTICIPATING FARMERS

The Potter farmers' characteristics of age, educational level and size of enterprise presented above suggest that they fit the classic pattern of innovators and early adopters outlined by rural sociologists (Rogers, 1983)[1]. Hence they can be expected to adopt new technology such as whole farm planning faster than their peers, and in most cases will serve as good examples or 'opinion leaders' for other members of the farm community.

Potter farmers first became involved in the scheme for several reasons. They were interested in and had an appreciation of whole farm planning, while at the same time they were concerned about their own problems of land degradation. The Potter farmers also had to satisfy certain criteria to be selected to participate in the PFP project. The selection process was based on criteria such as: the farm had some type of land degradation problem, the farm was visible from a sealed road and farmer did not intend selling the property in the short term.

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1 Rogers, E. M. (1983), Diffusion of Innovations, The Free Press, New York.

Table 30:   Where First Heard of Potter Farmland Plan

SOURCE	DUNDAS (N=27) 66%	CHARLTON (N=4) 10%
Newspaper	14	-
Relation or friend	4	-
Radio	2	-
Dept Ag, council	2	-
Television	1	-
Received Potter letter	1	-
VFF	-	1
Not sure	3	3

Table 31:   Function of Farm Tree Groups (number of mentions)

FUNCTION	DUNDAS (N=28) 68%	CHARLTON (N=30) 73%
Provide trees and labour	7	19
Information on trees and tree planting	10	6
Encourage to plant trees, promote	7	5
Meetings and discussions between farmers	3	2
Experiment with different tree species etc.	3	1
Conservation, reclamation projects	-	7
Farm inspections	2	-
Other [1]	2	-
Not sure	7	8

1 field days and pressure the government

Table 32: Source of First Information About Farm Tree Groups

SOURCE	DUNDAS (N=28) 68%	CHARLTON (N=33) 81%
Newspaper	8	10
Television	5	4
Radio	1	4
Relation or friend	1	3
VFF meeting or magazine	2	2
Influential in community	3	-
Hamilton Show, field day	2	-
Local council	-	1
Local SCA	-	1
Not sure	6	8

Table 33: When First Heard of Farm Tree Groups

TIME	DUNDAS (N=27) 66%	CHARLTON (N=33) 80%
0 - 1 YEARS AGO	3	5
1 - 2 YEARS AGO	8	8
2 - 3 YEARS AGO	5	5
3 PLUS YEARS AGO	6	9
NOT SURE	6	6

Although inclined to take positive steps towards combating degradation, Potter farmers pointed out that the financial incentives and advice offered by the PFP were very attractive incentives to do something (Tables 8 and 34). Most saw the main objectives of the PFP as educational and demonstrational, inducing attitude change among other farmers as well as among members of the wider community (Table 35). They also recognised control of land degradation, reestablishment of trees and vegetation and landscape improvement as principal environmental objectives of the PFP.

Potter farmers spoke positively about the effects of participating in the Whole Farm Planning process. They had become more aware of land degradation and the ways to combat it, especially those involving tree planting (Tables 36, 37 and 38). Participation also brought some problems, chiefly related to financial and time limitations. Some expressed disappointment at the rate at which their whole farm plan was being implemented, citing instances in which they had not received programme plans for the forthcoming year, or had not had signs posted outside their property (Table 39). Improved farm layout and management were given as positive outcomes from participation, and several mentioned that land degradation would be halted. Although some were moving in these directions before joining the project, participation in the PFP had accelerated their rate of progress significantly. Others also mentioned increases in the value and productivity of their property, and improvements in stock water supply and general farm appearance (Table 40).

Potter funding was introduced for three years, and most participating farmers believed they have an ongoing responsibility to carry on the work after funding ceases. Some also indicated they would have to increase work on badly affected areas of land, as with tree planting, thus setting an example to the rest of the farm community (Table 41). However, all Potter farmers believe that government should help their efforts to combat land degradation by giving financial assistance or tax relief and providing advice and information on Whole Farm Planning (Table 42). More than half also believe that private enterprise has a role to play by making the necessary inputs available when and where needed. Furthermore, they feel the general community also should help by adopting a supportive and informed view of landscape reclamation and improvement activities.

Table 34: Reasons for Initial Involvement with the Potter Farmland
          Plan (number of mentions)

REASON	POTTER (N=16)
Already interested in WFP, Potter speeded things up	13
General concern about land degradation	10
Increase in salting affected areas	2
Increase in tree deaths and decline	2
Example to others	1
Farm run down	1

Table 35: Farmers' Opinions of the Main Objectives of the Potter
          Farmland Plan (number of mentions)

OBJECTIVE	POTTER (N=16)
Demonstration farms	10
Reduce or stop land degradation	8
Increase awareness of farmers	7
Increase awareness of the community	7
Reestablish trees and vegetation	5
Improve the landscape	3
Tree planting	3

Table 36: How Farmers have been Helped by Potter (number of mentions)

ASSISTANCE	POTTER (N=16)
Material, financial assistance and incentive	10
Advice, information and planning	10
Potter speeded up the process	5
Labour (volunteers)	3
Identification of the worst degraded areas	2
Improved farm management	1

Table 37: How Farmers Perceive Themselves to have been Influenced by the Potter Whole Farm Planning Process (number of mentions)

INFLUENCE	POTTER (N=16)
Knowledge of the techniques to combat land problems	8
Awareness of the seriousness of the land problems	6
More positive attitude to trees	4
Potter has speeded up the process of whole farm plan	3
Awareness of the different techniques of tree planting species and fencing etc.	2
Have not been	4

Table 38: What Farmers have Learned from their Participation (number of mentions)

THING LEARNED	POTTER (N=16)
Awareness of the different techniques of tree planting species and fencing etc.	7
How to combat land degradation	6
Awareness of the seriousness of the land problems	5
Ease and economical nature of tree planting	4
Have not learned anything	1

Table 39: Problems Associated with Involvement in the Potter Farmland Plan Project (number of mentions)

PROBLEM	POTTER (N=16)
Time limitations	5
Workload clashes, timing of labour & materials	4
Received no plan	4
Money to complete the plan	3
Work going slower than expected	1
Project is not as group orientated as expected	1
No signs out the front of the property	1
Only planting big trees	1

Table 40: Outcome for Farmers involved in the Potter Farmland Plan (number of mentions)

OUTCOME	POTTER (N=16)
Speeding up the whole farm planning process	9
Better layout, planning and management of the farm	6
Improved appearance of the farm	4
Improved productivity and halted land degradation	8
Improved value of the farm	3
More trees and fencing on farm	2
Increase in knowledge	3
Demonstration farm	1
Improved stock water supply	1

Table 41: Potter Farmers Ongoing Responsibilities (number of mentions)

RESPONSIBILITY	POTTER (N=16)
Continue to implement plan	10
Increase work on badly affected areas of land	6
Lead by example	3
Plant trees	3

Table 42: How the Community, Government and Private Enterprise Should
           Help Farmers in their Efforts to Combat Land Degradation
           (number of mentions)

FORM OF HELP	NO. OF RESPONSES
COMMUNITY	(N=9)
Community awareness and projects to change attitudes	6
Volunteer workers from service organizations	4
Taxes, indirectly	3
Teaching and education to change attitudes	2
GOVERNMENT	(N=16)
Tax incentives, subsidies	10
Direct handouts, grants	8
Information and advice available	7
Tax deductions	4
Remove disincentives, eg. rates, capital gains	3
Change community attitudes (education)	3
Trees, seed and WFP facilities available	1
PRIVATE ENTERPRISE	(N=10)
Advice available	5
Labour and materials available	4
Technology available	3
Tax incentives, indirectly	3
Finance available	1
Attitudes	1

9. MULTIDIMENSIONAL ANALYSIS OF ATTITUDES TOWARDS LAND MANAGEMENT FOR CONSERVATION: THEORY AND METHOD

Overview: Interpreting Galileo Scaling Analyses

The Galileo procedure is a metric multi-dimensional scaling procedure which arrays all the relevant objects and their attributes into a "map" or space. Within this space, concepts (attributes or objects) which are similar or "go together" are located close to each other, while concepts that are seen as different from each other are located far apart in the space. One of the concepts is the "self point", or the position that the average respondent takes relative to the various object concepts and attribute concepts. Substantial previous research has shown that distance between a product, brand or service and the self point is highly predictive of the behaviour of the relevant population toward the product or service. The closer a given object is to the self point ("me") the more favourably the group or population is disposed towards the given object. Similarly, the closer any two concepts are to each other the closer is their similarity or association as viewed by the survey sample.

Description of the Galileo Technique

The Galileo system of measurement is a set of procedures for making a "mental map" of any group of people on some nominated topic. These "maps" can be used in a number of useful and innovative ways. The characteristic of the Galileo system - which differentiates it from conventional product mapping techniques used in market research - is its precision: both in the level at which data is collected, and subsequently, the level of precision at which analysis is undertaken, which allows sophisticated tracking comparisons for given populations over time. For example, the analysis is not restricted to the the two or three dimensions used in conventional multidimensional scaling but encompasses all the dimensions that are necessary to totally explain the data.

The first step in a Galileo study is to find out which concepts a group uses to define and understand the topic of interest in their own minds. This is done by asking a systematically chosen subsample of the group to talk about the topic in some depth. The concepts - attributes and objects - which they mention most frequently are the key filter categories in terms of which they themselves understand the topic.

The second step in a Galileo study is to determine the relationships people see between the key concepts. This is done by a questionnaire in standardised format in which respondents are asked to estimate the separations or distances between all possible non redundant pairs of the key concepts, using as a "ruler" an arbitrary distance of, say, 100 units between a criterion pair of concepts such as "good" and "bad".

When the data have been gathered they are analysed with the Galileo program to find the coordinates of the concept objects in multidimensional space. The data for analysis are the means of the aggregrate individual distance measures. Since precision is important in identifying attitude and belief change over time the metric scaling program is distance-preserving. This means that the original distances are not rescaled or transformed and the raw distances can always be recovered from the coordinates.

The two major advantages of the Galileo technique are firstly, the level of precision that follows from the level of precision in measurement and the precision in the metric scaling analysis. The second advantage is that the Galileo system uses the concepts that the audience themselves use to define the topic under consideration, rather tnan imposing a restricted set of attributes which may not be relevant to the audience. The combination of a qualitative approach with qualitative precision provides a powerful research system for the investigation of attitudes and beliefs.

The Theory

In Galileo theory a "domain of cognition" is represented as a multidimensional space. Every point in this space is considered to have a meaning. Points which are "close" to each other in the space have similar meanings, and points which are "far" from each other differ in meaning in proportion to their distance from each other.

Beliefs, Attitudes and the Self Concept

Within a "domain" or "neighborhood" of cognition each individual may label a point or subregion as "himself". Like any point in the space, the self has a meaning which is given entirely by its location in the space -- that is, by its distance relations with the other points or concepts. We expect that individuals will locate their self point close to those concepts which they believe describe them well, and far from those concepts which they believe describe them poorly or not at all.

Within the theory, an attitude is defined as the distance relation between the self-point and any other point; a belief is defined as the distance relation between any two points. Since beliefs are defined as the distance relations between points in the space, and attitudes are defined as distance relations between the self and other points, changes in beliefs and attitudes may be represented as motions of the points relative to one another.

The location of the self point relative to other "objects" or constructs in the space is assumed to have behavioural significance. Any behaviour, of course, may be represented as a point or region in the space, and behaviours are assumed to be performed with a frequency inversely proportional to their distance from the self point. Product market share is inversely proportional to distances of the products from the average self of a market, and so on.

Planned Intervention

When a "self concept" is included as one of the concepts in a Galileo study, the Galileo multidimensional coordinate space can be used to assess the persuasive effectiveness of message sets constructed from the concept words used in the study. The unique aspect of Galileo theory is that it is the first theoretical system to offer a scientific rationale by which the exact content of persuasive messages may be determined in advance of any particular media campaign. That is, one of its products is a small list of the precise words to be used in a persuasive message. Galileo methods specify in advance the maximally efficient exact content. Galileo methods indicate which subsets will have the intended persuasive effect, which will have no effect, and which will yield effects opposite to those intended. The basic social psychological premise of the Galileo system is that the shorter the distance between one's self conception and any given non-self object, the more likely one is to act upon the object in a favourable manner. Thus, a series of words, as in a sentence, that are close to the self will be more persuasive than those that are distant.

The Galileo system provides a technique for measuring the distance between objects or concepts. A mathematical model is used for estimating the effect of any combination of words or phrases on a group's attitude toward a nominated object and on the group's cognitive structure. Specifically, any two concepts associated in some "message" (for example, "A is B"), will approach their common centre in the cognitive space. Similarly, any larger number of concepts associated in a message are expected to approach their common geometric center. This approach quantifies what is often implicitly intended in word associations used in conventional advertising message design.

COSTLY

EXTRA WORK

SHADE AND SHE

WHOLE FARM

ME

CASH INCENTIVES

TREES

REVERSING LAND DEGRADATION

FARM PLAN

IMPROVED MANAGEMENT OF THE PAR

IMPROVING FA PRODUCTIVITY

GOVERNMENT ADVISO

LONG TERM BENEFITS

DUNDAS FARMERS' CONCEPTS

10. MULTIDIMENSIONAL ANALYSIS OF ATTITUDES TOWARDS LAND MANAGEMENT FOR
    CONSERVATION: GALILEO ANALYIS OF THE SURVEY GROUPS

The Galileo analysis is performed on the means derived from the data
sets of the respondents in each of the sampling areas. A common set of
12 concepts was administered to the three groups; additional concepts
were used with the Potter and Dundas groups (see Table 43). The mean
distances of all the attributes from Me and from three relevant
concept objects (Potter farmland plan, Wholefarm planning and
Reversing land degradation) for the three relevant research samples
are given in Tables 44, 45, 46, and 47. Mean distances between all
concept combinations presented to the survey respondents are shown in
Appendix A. These are the base data upon which the Galileo analysis is
undertaken.

The Potter Farmland Plan Farmers

Potter farmland plan farmers closely associated themselves with
Improving farm productivity, Improved management of the farm, Potter
farmland plan, Whole farm planning and Reversing land degradation
(Figure 3). Somewhat suprisingly, Tax and cash incentives[2] were not
favoured, at least in terms of espoused attitudes. The Potter farmland
plan farmers were somewhat indifferent towards Government advisory
services.

The beliefs of the Potter farmers regarding the Potter farmland plan
were that it is most closely associated with Planting trees, Reversing
land degradation, Whole farm planning and Long term benefits.
Government advisory services were not associated with the Potter
farmland plan.

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2 Tax and cash incentives is a general reference to tax and cash
  incentives, rather than specifically for land conservation
  purposes.

Table 43: Concepts Investigated in the Three Studies

CONCEPT	PFP	DUNDAS	CHARLTON
SHADE AND SHELTER	1	1	1
IMPROVING FARM PRODUCTIVITY	2	2	2
REVERSING LAND DEGRADATION	3	3	3
IMPROVING THE LANDSCAPE	4	-	-
LONG TERM BENEFITS	5	4	4
POTTER FARM PLAN	6	5	-
IMPROVED MANAGEMENT OF THE FARM	7	6	5
PLANTING TREES	8	7	6
EXTRA WORK	9	8	7
IMPROVED DAMS AND WATER SUPPLY	10	-	-
COSTLY	11	9	8
WHOLE FARM PLAN(designing a new farm layout)	12	10	9
ME	13	11	10
GOVERNMENT(TAX & CASH)INCENTIVES	14	12	11
GOVERNMENT ADVISORY SERVICES	15	13	12
INCREASING LAND VALUES	16	-	-
Total number of concepts used	16	13	12
Mean distance	44	52	60

Table 44: Distance From Me

CONCEPT	PFP	DUNDAS	CHARLTON
SHADE AND SHELTER	44	29	53
IMPROVING FARM PRODUCTIVITY	19	48	29
REVERSING LAND DEGRADATION	19	29	42
LONG TERM BENEFITS	27	67	34
POTTER FARM PLAN	15	66	--
IMPROVED MANAGEMENT OF THE FARM	12	58	32
PLANTING TREES	23	66	52
EXTRA WORK	31	66	48
COSTLY	71	53	65
WHOLE FARM PLAN	15	42	31
GOVERNMENT (TAX & CASH) INCENTIVES	132	64	71
GOVERNMENT ADVISORY SERVICES	51	64	73
Mean distance	44	52	60

Table 45: Distance from Potter Farmland Plan

CONCEPT	PFP	DUNDAS
SHADE AND SHELTER	23	26
IMPROVING FARM PRODUCTIVITY	30	38
REVERSING LAND DEGRADATION	9	35
LONG TERM BENEFITS	16	49
IMPROVED MANAGEMENT OF THE FARM	32	36
PLANTING TREES	6	27
EXTRA WORK	27	38
COSTLY	45	67
WHOLE FARM PLAN	13	34
ME	15	66
GOVERNMENT (TAX & CASH) INCENTIVES	130	88
GOVERNMENT ADVISORY SERVICES	90	67
Mean distance	44	52

Table 46: Distance from Whole Farm Planning

CONCEPT	PFP	DUNDAS	CHARLTON
SHADE AND SHELTER	29	36	50
IMPROVING FARM PRODUCTIVITY	25	33	54
REVERSING LAND DEGRADATION	13	30	49
LONG TERM BENEFITS	20	30	51
POTTER FARM PLAN	13	26	--
IMPROVED MANAGEMENT OF THE FARM	16	28	41
PLANTING TREES	22	39	54
EXTRA WORK	42	45	52
COSTLY	52	51	61
ME	15	42	31
GOVERNMENT(TAX & CASH)INCENTIVES	97	78	68
GOVERNMENT ADVISORY SERVICES	61	76	68
Mean distance	44	52	60

Table 47: Distance from Reversing Land Degradation

CONCEPT	PFP	DUNDAS	CHARLTON
SHADE AND SHELTER	25	48	79
IMPROVING FARM PRODUCTIVITY	19	40	43
IMPROVING THE LANDSCAPE	22	--	--
LONG TERM BENEFITS	10	28	36
POTTER FARM PLAN	9	35	--
IMPROVED MANAGEMENT OF THE FARM	21	37	42
PLANTING TREES	22	36	64
EXTRA WORK	36	64	57
IMPROVED DAMS AND WATER SUPPLY	46	--	--
COSTLY	40	59	62
WHOLE FARM PLANNING	13	30	49
ME	19	29	42
GOVERNMENT(TAX & CASH)INCENTIVES	78	65	72
GOVERNMENT ADVISORY SERVICES	55	71	70
INCREASING LAND VALUES	30	--	--
Mean distance	44	52	60

1 Shade and Shelter
2 Improving Farm Productivity
3 Reversing Land Degradation
4 Improving the Landscape
5 Long Term Benefits
6 Potter Farm Plan
7 Improved Management of the Farm
8 Planting Trees
9 Extra Work
10 Improved Dams and Water Supply
11 Costly
12 Whole Farm Plan
13 Me
14 Government Incentives
15 Government Advisory Services
16 Increasing Land Values
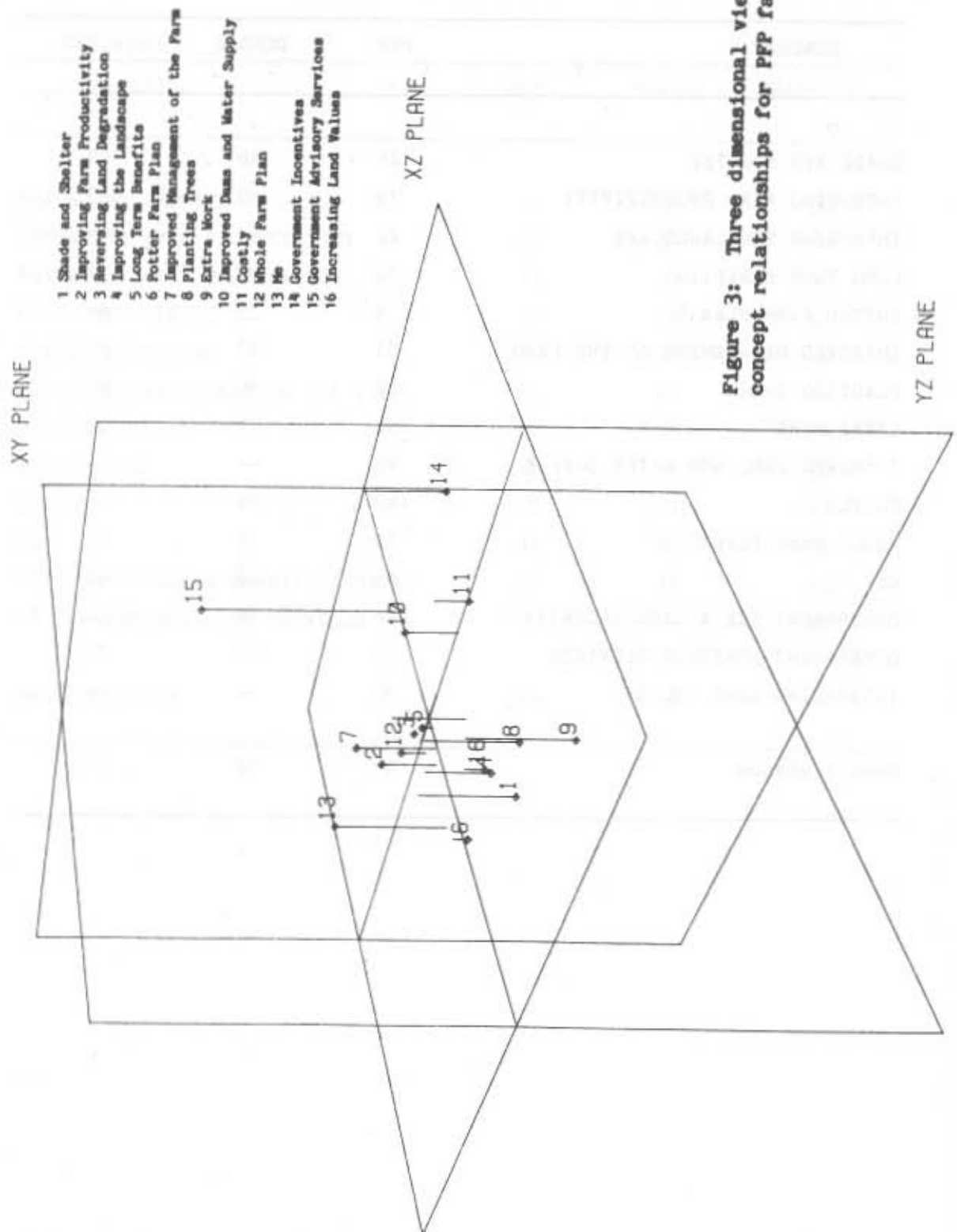
XY PLANE

XZ PLANE

YZ PLANE

Figure 3: Three dimensional view of concept relationships for PFP farmers.

The Dundas Farmers

Dundas farmers did not associate themselves closely with most of the set of conservation land management concepts; the exception was a close association with Shade and shelter and Reversing land degradation. This relationship is more obvious in the raw distance data (Table 44) than in the plot of the first three dimensions of the total space (Figure 4).

The Potter farmland plan is seen as very closely associated with Planting trees and Shade and shelter and to a lesser extent with Whole farm planning. There appeared to be some ambivalence toward Government advisory services and toward Tax and cash incentives, but the latter were not viewed with the disfavour identified in the PFP farmers.

The Charlton Farmers

Charlton farmers were closely associated with Improving farm productivity, Improved management of the farm, Long term benefits, Reversing land degradation and Whole farm planning (Figure 5). This production orientation contrasted with Planting trees which was associated with Shade and shelter and which was regarded as being Costly and Extra work. This supports evidence presented earlier that a greater proportion of Charlton farmers, for whom cropping is the predominant enterprise, see Planting trees as competitive with productive enterprises.

Tax and cash incentives were seen as Costly but were not otherwise related to other concepts.

Comparisons between the Groups: Potter and Dundas

The differences between groups can be observed by considering the distances between equivalent concepts for the two groups after the concepts of the two groups have been matched by a least squares best fit process. These differences can be identified by reference to the three dimensional plot (see Figures 6 and 7).
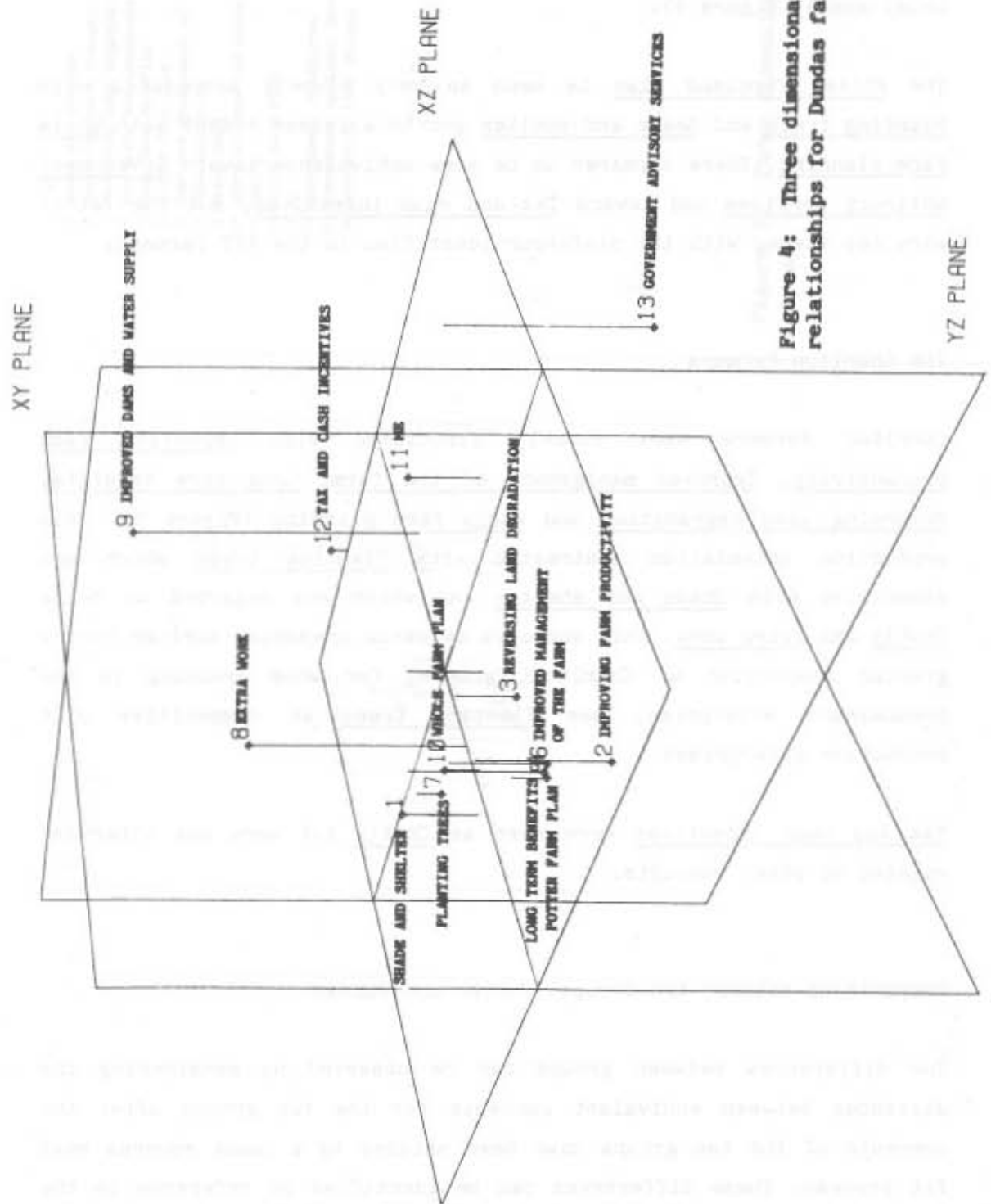
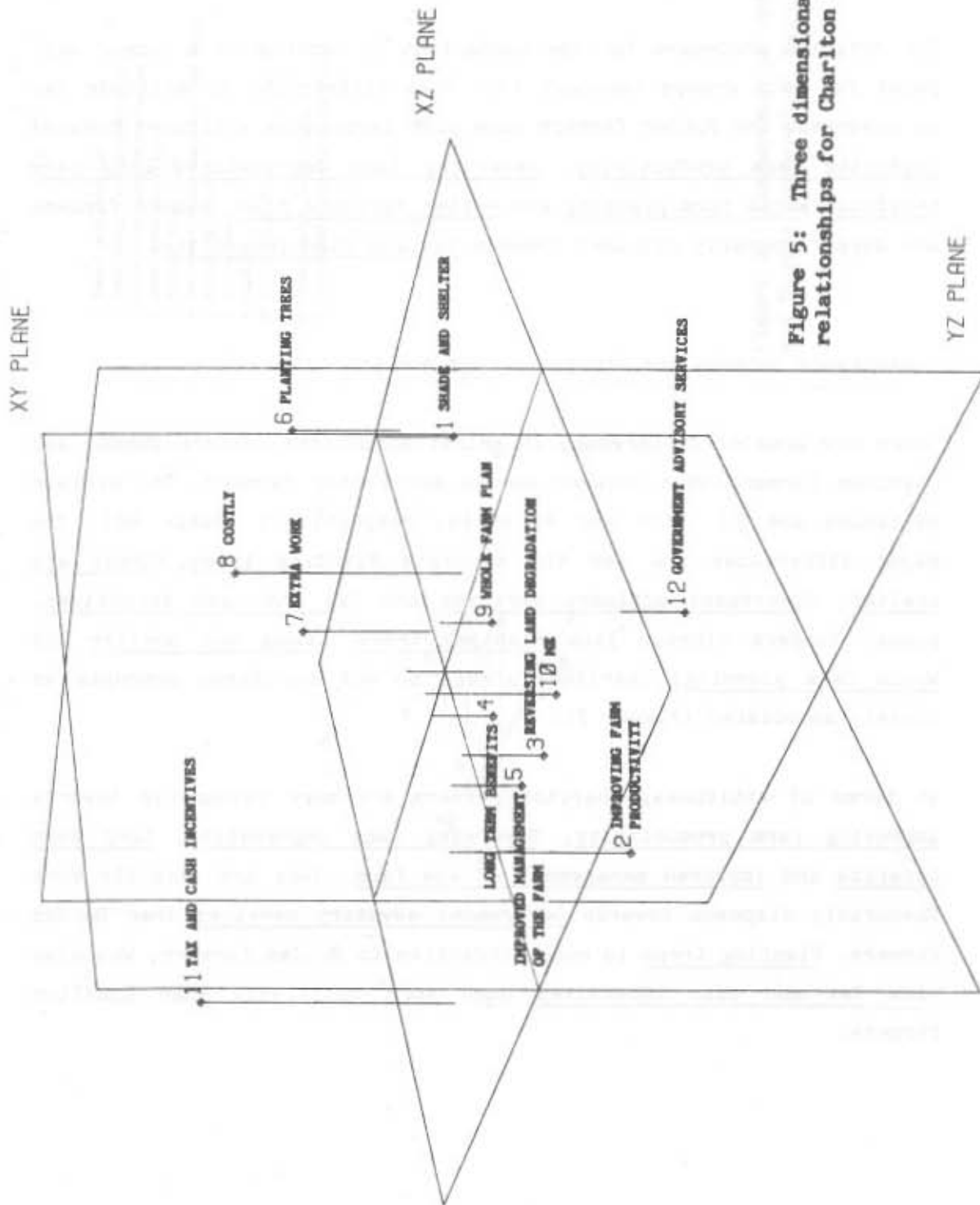**Figure 4: Three dimensional view of concept relationships for Dundas farmers.**

Figure 5: Three dimensional view of concept relationships for Charlton farmers.

The belief structures of Potter and Dundas farmers are essentially similar (Figure 6) With the exception of concepts 8 and 9 which are not particularly informative, the concepts are displaced for the two groups, but arrayed similarly. The major exception is concept 13 Government advisory services which is not closely linked with other concepts for either group.

The rotation procedure for the comparison is centred on a common self point for both groups (concept 11). Thus differences in attitude can be observed. The Potter farmers have more favourable attitudes towards Improving farm productivity, Reversing land degradation, Long term benefits, Whole farm planning and Potter farmland plan. Dundas farmers are more favourably disposed towards Tax and cash incentives.

Comparisons between the Groups: Dundas and Charlton

There are greater differences in belief structures between Dundas and Charlton farmers than between Dundas and Potter farmers. The average distances are 71 units and 49 units, respectively (Table 48). The major differences are for the concepts Planting trees, Shade and shelter, Government advisory services and Tax and cash incentives. Dundas farmers closely link Planting trees ,Shade and shelter and Whole farm planning; Charlton farmers do not see these concepts as closely associated (Figure 7).

In terms of attitudes, Charlton farmers are more favourable towards Improving farm productivity, Reversing land degradation, Long term benefits and Improved management of the farm. They are slightly more favourably disposed towards Government advisory services than Dundas farmers. Planting trees is more attractive to Dundas farmers, who also view Tax and cash incentives much more positively than Charlton farmers.

XY PLANE

XZ PLANE

YZ PLANE

1 Shade and Shelter
2 Improving Farm Productivity
3 Reversing Land Degradation
4 Long Term Benefits
5 Potter Farm Plan
6 Improved Management of the Farm
7 Planting Trees
8 Extra Work
9 Costly
10 Whole Farm Plan
11 Me
12 Government Incentives
13 Government Advisory Services

Figure 6: Comparison of PFP farmers'(●) and Dundas farmers'(◆) belief structures.

XY PLANE

1 Shade and Shelter
2 Improving Farm Productivity
3 Reversing Land Degradation
4 Long Term Benefits
5 Improved Management of the Farm
6 Planting Trees
7 Extra Work
8 Costly
9 Whole Farm Plan
10 Me
11 Government Incentives
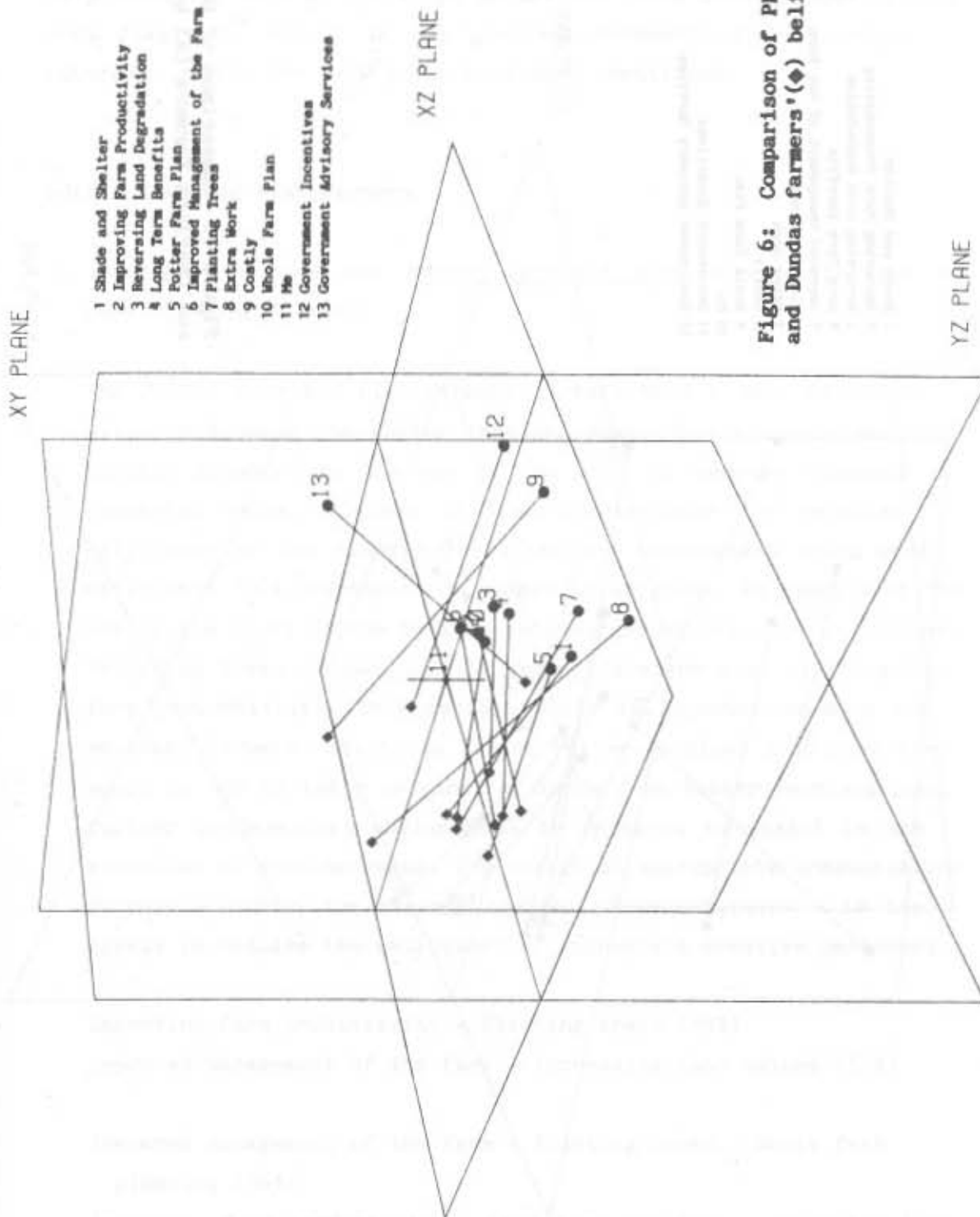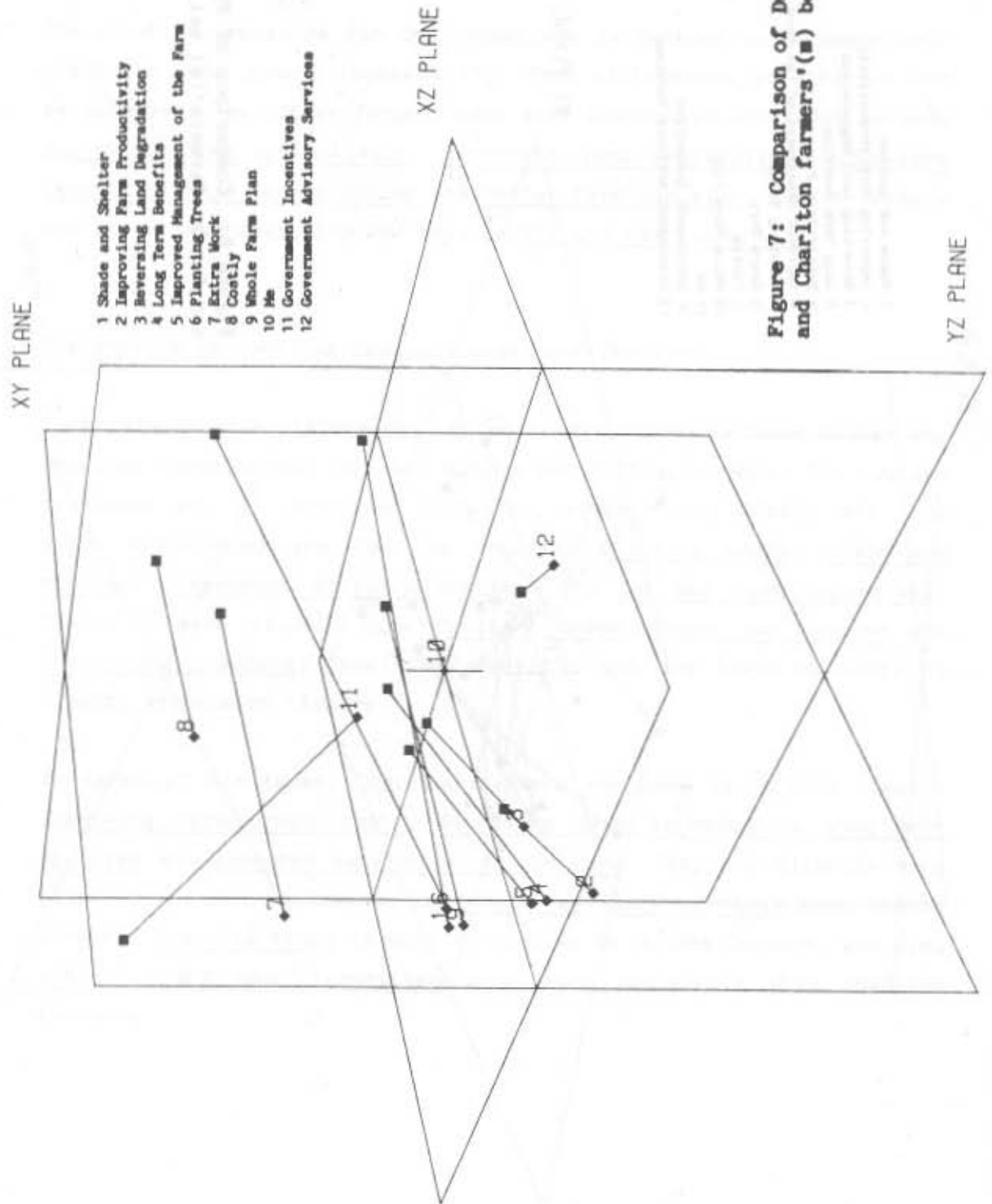12 Government Advisory Services

XZ PLANE

YZ PLANE

Figure 7: Comparison of Dundas farmers'(♦) and Charlton farmers'(■) belief structures.

11. COMMUNICATION STRATEGIES

The Galileo multidimensional analysis provides a means of establishing the most effective concepts and combinations of concepts which can be used as the bases of, or themes of, messages in extension programmes, communication strategies, or in advertising copy. The likely effect of linking a given concept with all other relevant concepts has been calculated for each of the three groups and those concept combinations most likely to result in the greatest movement of the concept of interest towards the self point have been identified.

Potter Farmland Plan Farmers

1. Messages to make the Potter farmland plan more attractive to participating farmers:

   The Potter Farmland Plan farmers already have a very favourable attitude towards the Potter farmland plan. This attitude may be further enhanced by the use of the sets of message concepts presented below. Figures in brackets indicate the relative efficiency of the message sets, smaller percentages being more efficient: 100% represents no change in attitude. An example of the use of the first of the message sets suggested below is as follows: "Planting trees as part of the Potter farmland plan will improve farm productivity". This message would be expected to move the relevant farmers' attitudes toward Potter farmland plan such they would be 49% of their original distance from Potter farmland plan. Further professional advice will be required to assist in the execution of such messages. The design of appropriate communication formats - beyond the message content presented below - is the likely to require the employment of appropiate creative personnel.

   Improving farm productivity - Planting trees (49%)
   Improved management of the farm - Increasing land values (50%)

   Improved management of the farm - Planting trees - Whole farm
      planning (36%)
   Improving farm productivity - Long term benefits - Improving farm
      dams and water supply (43%)

2. Messages to make <u>Whole farm planning</u> more attractive to participating farmers:

   Improving farm productivity - Planting trees (48%)
   Improving farm productivity - Increasing land values (49%)

   Improving farm productivity - Improved management of the farm - Improving farm dams and water supply (46%)

The Dundas Farmers

1. Messages to make <u>Planting trees</u> more attractive to participating farmers:

   Improving farm productivity -Reversing land degradation (51%)

2. Messages to make <u>Whole farm planning</u> more attractive to participating farmers:

   Shade and shelter - Improving farm productivity - Reversing land degradation (64%)

3. Messages to make the <u>Potter farmland plan</u> more attractive to participating farmers[3]:

   Shade and shelter - Tax and cash incentives (46%)
   Reversing land degradation - Tax and cash incentives (58%)
   Whole farm planning - Tax and cash incentives (58%)
   Reversing land degradation - Improved management of the farm (64%)

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3 It is not envisaged that the name <u>Potter Farmland Plan</u> would be usefully promoted beyond the Potter demonstration farms, rather the concepts embraced in Whole Farm Planning.

The Charlton Farmers

1. Messages to make <u>Planting trees</u> more attractive to participating
    farmers:

    Shade and shelter - Improving farm productivity - Improved
      management of the farm (35%)
    Improving farm productivity - Improved management of the farm -
      Whole farm planning (31%)

2. Messages to make <u>Whole farm planning</u> more attractive to
    participating farmers:

    Improving farm productivity - Improved management of the farm -
      Planting trees (32%)

3. Messages to make <u>Reversing land degradation</u> more attractive to
    participating farmers:

    Improving farm productivity - Improved management of the farm (56%)
    Improving farm productivity - Improved management of the farm -
      Whole farm planning (39%)

Promoting Government Advisory Services

    Message components to make <u>Government advisory services</u> more
      attractive to farmers in the Dundas and Charlton Shires:

    Reversing land degradation - Whole farm planning (Dundas 52%,
      Charlton 38%)
    Improving farm productivity - Reversing land degradation - Whole
      farm planning (Dundas 55%, Charlton 27%)

Recommended Communication Strategy

It does not seem necessary to further promote acceptance of the Potter farmland plan to current PFP participants, as they already have a very favourable attitude toward the plan. Participating farmers' attitudes to the plan will be predominantly influenced by the experience of their participation in the PFP and their relationships with PFP personnel.

In the wider promotion of the PFP it will be logical to start with farmers in the south western area of Victoria. An initial decision will be to establish whether the PFP concept itself should be promoted or some of the component management strategies of which it is comprised. If the PFP is to be promoted, the recommended strategy would be to link Potter farmland plan with improved management of the farm and reversing land degradation. To promote the concept of whole farm planning, messages should be used which link whole farm planning with improving farm productivity, shade and shelter and reversing land degradation.

12. CONCLUSIONS AND IMPLICATIONS

Farmers in each of the survey groups had a positive attitude towards reversing land degradation which was seen to be associated with long term benefits. A positively expressed attitude does not necessarily mean that individual farmers will undertake the necessary actions to bring about improved land management; however, it is likely to be a necessary precondition for such action. The multidimensional analysis allowed an "in depth" exploration of farmers' beliefs and attitudes concerning land degradation, the attributes associated with improved land management and their attitudes toward management activities to reduce land degradation.

While farmers' attitudes towards control of land degradation are quite positive their beliefs differ markedly in character between districts. Thus, while Dundas Shire and PFP farmers clearly associate tree planting and whole farm planning as control strategies against land degradation, Charlton farmers do not. For Charlton farmers trees are predominantly for shade and shelter. They prefer to restrict trees to shelter belts and around buildings. While this point may seem obvious to anyone who is familiar with the differences in enterprises (grazing in Dundas and cropping in Charlton), it means that messages transmitted through the mass media require modification if they are to have maximum impact in a specific district.

Farmers participating in the PFP have strongly positive attitudes toward whole farm planning, reversing land degradation and improving farm productivity, as well as planting trees, which suggests that the major objectives of the PFP are being achieved.

The Potter organization clearly has won a high degree of acceptance by the farmers participating in the PFP. Government advisory services[4] are held in high regard by some farmers, although they do not appear to be held in particularly high regard by "the average farmer" in any of the three groups. This situation presents a significant challenge for the near future when responsibility for the activities encompassed by the PFP will revert to CF&L.

Active involvement of PFP farmers clearly has induced stronger positive attitudes towards control of land degradation. However, evidence from interviews among Dundas Shire farmers indicates that there are quite positive attitudes toward reversing land degradation and whole farm planning by Dundas farmers. Clearly, in a study that does not extend over time it is impossible to link PFP activities to this trend; however, the increased frequency of newspaper articles, radio and television broadcasts and field days which highlight conservation activities in a practical manner undoubtedly has heightened community awareness of problems and possible solutions.

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4 The concept "government advisory services" had a higher standard error compared with most other concepts implying greater differences of opinion regarding this concept.

There is still a considerable lack of awareness of the PFP. One third of farmers in the area of PFP operation were unaware of its existance. Obviously, there is opportunity for further promotion of the scheme. In the Charlton area there was still little knowledge or understanding of the PFP.

Increased awareness of the benefits of tree planting can be singled out as the most significant characteristic of farmers' attitudes. Despite agronomic differences between shires, Dundas and Charlton farmers are aware of the positive benefits provided by trees even though they may stress different aspects.

Most farmers who were aware of the PFP identified tree planting as the main feature of plan. If the programme is to be extended to other districts where there are substantial agronomic differences, extensive consideration will need to be given to other methods for controlling degradation which will attract favourable attention and support. Furthermore, it wil be important to use regional media outlets such as local newspapers and radio stations to attract attention to programme content and events.

The success of PFP has implications for future projects. Specifically, there would appear to be good reasons for concentrating extension and demonstration activities to agronomically similar and clearly defined areas in which staff can develop a high public profile identified with the district rather than with the state as a whole.

Selection of participants in any extension of the programme requires careful consideration. PFP farmers tended to be younger, better educated and have larger properties than the average for the district. Although we have no substantial reasons to criticise the initial selection of participants, we believe it is likely to be important to ensure that most are as close to being perceived as "typical" of the district. It is possible that farmers with very large properties, even if they are well placed in terms of demonstrating control measures to the largest numbers of passers by, may well have low credibility in the eyes of smaller farmers, simply because they are perceived as having the resources to undertake extensive control measures.

Appendix A

POTTER FARMER'S ATTITUDES 1788 15 FARMS   MEANS MATRIX

	1	2	3	4	5	6	7	8
1	0.000							
2	35.882	0.000						
3	25.000	19.176	0.000					
4	27.647	43.235	22.412	0.000				
5	26.824	21.176	9.765	42.412	0.000			
6	23.118	30.294	8.941	16.471	15.941	0.000		
7	43.941	15.059	21.235	51.471	23.353	31.471	0.000	
8	11.882	40.118	21.824	14.118	16.529	6.294	41.765	0.000
9	42.647	43.000	36.176	34.176	34.176	26.941	49.412	18.529
10	65.294	37.118	46.176	57.059	24.529	44.824	29.706	53.824
11	50.118	49.063	39.706	42.647	39.471	45.000	49.118	27.353
12	28.588	25.000	13.294	26.235	19.471	12.706	16.059	22.118
13	44.118	19.529	18.941	38.235	27.118	15.000	12.235	23.059
14	95.118	111.471	78.059	99.412	97.647	130.059	109.667	82.706
15	95.000	63.824	55.294	82.353	63.824	89.706	59.118	86.765
16	31.235	23.824	30.294	26.471	22.941	17.059	35.118	22.059

	9	10	11	12	13	14	15	16
9	0.000							
10	36.765	0.000						
11	35.294	33.529	0.000					
12	42.353	23.294	52.059	0.000				
13	30.625	21.235	71.176	15.412	0.000			
14	112.059	96.471	76.688	97.118	132.059	0.000		
15	107.941	68.235	51.471	61.294	51.375	75.882	0.000	
16	28.824	18.824	32.941	23.294	24.118	122.941	90.313	0.000

1 Shade and Shelter
2 Improving Farm Productivity
3 Reversing Land Degradation
4 Improving the Landscape
5 Long Term Benefits
6 Potter Farm Plan
7 Improved Management of the Farm
8 Planting Trees
9 Extra Work
10 Improved Dams and Water Supply
11 Costly
12 Whole Farm Plan
13 Me
14 Government Incentives
15 Government Advisory Services
16 Increasing Land Values

MEANS MATRIX

DUNDAS   FARMERS

	1	2	3	4	5	6	7	8
1	0.000							
2	38.784	0.000						
3	45.714	39.583	0.000					
4	29.459	29.811	27.568	0.000				
5	17.917	31.154	25.385	52.692	0.000			
6	50.556	41.081	36.676	19.865	35.000	0.000		
7	31.216	41.081	35.676	27.838	19.000	38.919	0.000	
8	57.838	50.556	64.324	55.139	28.462	47.917	55.972	0.000
9	55.189	76.351	58.514	67.162	65.385	66.351	53.472	37.917
10	35.946	32.639	29.583	30.417	26.250	27.703	38.919	44.865
11	29.000	47.703	28.676	67.083	61.364	58.108	66.111	65.833
12	79.583	73.611	64.583	47.571	86.667	70.000	52.353	78.571
13	86.806	68.056	70.972	59.286	61.538	66.528	70.833	83.571

	9	10	11	12	13
9	0.000				
10	50.571	0.000			
11	53.194	42.297	0.000		
12	53.382	77.694	64.206	0.000	
13	70.400	75.694	63.571	70.588	0.000

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11 Me
12 Tax and Cash Incentives
13 Government Advisory Services

CHARLTON FARMERS, SEPT 1986

MEANS MATRIX

	1	2	3	4	5	6	7	8
1	0.000							
2	67.054	0.000						
3	79.263	43.342	0.000					
4	51.053	37.368	35.605	0.000				
5	71.158	39.737	41.974	33.763	0.000			
6	28.158	84.605	64.211	47.500	63.842	0.000		
7	70.000	64.342	56.711	59.158	58.500	49.842	0.000	
8	66.351	66.184	61.789	60.711	60.974	53.921	59.526	0.000
9	49.865	54.079	48.632	50.838	40.658	53.500	51.632	61.211
10	53.211	29.342	41.842	34.158	31.974	51.711	48.289	64.763
11	100.946	64.474	71.757	58.158	60.395	85.184	70.921	67.778
12	100.811	70.132	69.868	67.895	67.947	89.211	81.053	73.737

	9	10	11	12
9	0.000			
10	30.842	0.000		
11	68.684	70.500	0.000	
12	68.158	72.737	85.974	0.000

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