

# 7. Segmentation Techniques Used in Development of Agriculture and Forestry Extension Programs

**Nick Emtage**

This chapter reviews the literature on the identification of landholder typologies that can be used to assist the design and delivery of extension programs. Australian researchers have developed typologies of landholders based on a variety of criteria. The methods used have differed according to the theories used to guide the research and the ‘clients’ or ‘sponsors’ of the research. The landholder types they describe, however, have a number of similarities. In this chapter, the rationale for developing landholder typologies is first discussed before reviewing the various approaches that have been used by Australian researchers and comparing their findings.

## 7.1 Rationale for Developing Landholder Typologies

Australian governments at all levels are promoting sustainable agricultural practices and farm forestry in an effort to achieve objectives in relation to environmental protection, biodiversity conservation, regional development and reduction in timber imports (Commonwealth of Australia 1992 a, b, 1997). Private land that has been inappropriately cleared in the past is the focus of the government efforts to promote the private plantation estate. Australian governments see the expansion of farm forestry as a way of achieving a number of these public objectives simultaneously. The problem facing governments is that the majority of private landholders in highly productive sub-tropical and tropical regions of eastern Australia have been less than enthusiastic about plantation development on their land despite active promotion of and assistance for farm forestry by State government land and forest management agencies. Landholders lack of response to many of these promotions has convinced governments of the need to understand better landholders’ visions of the appropriate role for farm forestry on freehold land, including their motivations for planting, perceived impediments to planting, and the types of incentives they desire. The situation is complicated by the variations in attitudes and socioeconomic circumstances within the rural community. Some landholders are enthusiastic about farm forestry while others are firmly opposed to plantation development on private farm land.

Many researchers and extension personnel have argued that decision-makers and extension providers need to understand better the variety of socioeconomic circumstances and value systems of the various sectors in the community, how these differences affect their land management attitudes and behaviour and how the differences lead to variation in the impacts of policies and programs across the community (Chamala 1980, Byron and Boutland 1987, Chamala *et al.* 1987, Raintree 1991, Emtage 1995, van den Ban and Hawkins 1996, Howden *et al.* 1998, Specht and Emtage 1998, Emtage and Specht 1998, Guerin 1999, Fulton and Race 2000, Howden and Vanclay 2000). It is desirable to have extension personnel consider the individual circumstances of landholders, yet policy-makers cannot hope to take every individual into account when designing extension programs.

Anthropologists, marketing professionals and those tracking public opinions seek clusters or groups of people in the community with similar attitudes and use typologies to describe the characteristics of the various groups they have defined. Typologies are a means to help understand and describe the variation in the community by improving understanding of how various combinations of socio-economic characteristics ‘lead’ to or result in differing land management behaviour. Such an approach can help to target extension programs, and communication strategies and strategic plans for the development of the timber industry and conservation planning at a regional scale (Chamala 1980, Byron and Boutland 1987, 1987, Raintree 1991, Emtage 1995, van den Ban and Hawkins 1996,

Howden *et al.* 1998, Specht and Emtage 1998, Emtage and Specht 1998, Guerin 1999, Fulton and Race 2000, Howden and Vanclay 2000). Typologies can further help to understand how programs will affect landholders in differing social and economic circumstances, and help to match the needs of potential timber suppliers to timber processors and assist in understanding potential regional timber industry structures (Race 1999, Fulton and Race 2000).

In designing a methodology to classify farmers it is important to choose a system that will fit with the intuitive understanding of intra-community variation by extension workers and development program designers, will be useful in aiding the design and implementation of development programs, and preferably can be replicated in other regions without the need for extensive fieldwork. Howden and Vanclay (2000, p. 206) have argued that '(i)f a classification of social behaviour is to have theoretical and practical utility, it must possess sociological explanatory power and predictive capacity. Classifications should also have social legitimacy, a property all too often missing from structure-based classifications imposed (*etic*) rather than derived (*emic*). From farmers perspectives, classification schemes based on wealth, size (*of property*) or adoption behaviour have little explanatory power, predictive capacity or social legitimacy' (words in italics added by the author).

The practice of defining landholder typologies in respect to their land management practices is becoming more common in Australia. Previous studies have defined landholder types according to their management of perennial pastures (Barr 1996), their 'farming style' (Vanclay *et al.* 1998, Howden *et al.* 1998) and their cattle breeding practices (Kaine and Lee 1994). A number of surveys in Australia have employed segmentation techniques to help describe the variation in farm forestry attitudes and practices in the community. Emtage (1995), Specht and Emtage (1998) and Emtage *et al.* (2001) have employed the use of cluster analysis techniques to develop typologies of landholders and assist in analysing and describing landholders' responses to surveys. Fulton and Race (2000) also emphasise the importance of developing regional landholder typologies in order to assist the strategic development of regional timber industries, and have devised a 'typical' typology matching landholders to various industry structures to illustrate the concept. There are a number of similarities between the typologies these researchers have developed, and there would appear to be some potential for the development of a broad system of typologies that relates to general land management practices. The findings of the approaches are summarised below along with their advantages and disadvantages.

## 7.2 Typologies of Landholders in Australia

The term 'typologies' can be used to describe the development of archetypal descriptions of various 'typical' landholders (Fulton and Race 2000, Emtage *et al.* in prep.). Other terms have been used to describe similar approaches including 'segmentation' (Chamala 1987, Vanclay 1995, Barr 1996), 'farming styles' (Vanclay *et al.* 1998, Howden *et al.* 1998) and 'target groups' (Chamala *et al.* 1980, Chamala 1987, Vanclay and Lawrence 1995). The differences in terminology between the various researchers who have attempted to devise typologies of Australian landholders reflect differences in their theoretical approaches.

A wide range of techniques has been used to define typologies of landholders in the rural community (Table 7.1). Some researchers have sought for farmers to describe themselves and other farmers in the community, such as the definition of 'farming style' by Vanclay, Howden and others. Another technique has been to test for differences in attitudes or behaviour in terms of one or two land management variables and then assess if these differences relate to other socioeconomic differences. Barr (1996) described the market segments for perennial pastures based on landholders attitudes to perennial pastures, while Emtage and others used attitudes to tree planting as the basis for defining types of landholder with differing interests in tree growing in eastern Australia (Emtage 1995, Specht and Emtage 1998, Emtage *et al.* 2001). Race (1999) described potential landholder types in Australia, mainly based on the size of the property operated, specifically in relation to the development of regional timber industries. Fulton and Race (2000) discussed the various socioeconomic factors

affecting plantation development in regard to the characteristics that the timber industry should identify to target efficiently landholders for partnership programs, and described a broad typology of landholders matched to various potential regional timber industry structures. Rogers (1995) and others devised a system of landholder typologies based on the propensity of landholders to adopt new practices. Finally, Kaine and Lee (1994) tested whether it was possible to group farmers usefully according to their beef cattle breeding practices.

**Table 7.1.** Methods, applications and study areas of research using segmentation or typology methodologies to group rural landholders in Australia

Study authors	Area studied	Basis for segmentation	Application
Kaine and Lee (1994)	Victoria	'Farming context' <sup>a</sup>	Facilitation of farm enterprise development
Emtage (1995)	Richmond River Catchment (north-east New South Wales)	Ratings of importance for various reasons for planting trees on private landholdings	Development of farm forestry extension and assistance programs and public policies
Rogers (1995)	International	Propensity to adopt new practices	Development of any or all extension and assistance programs
Barr (1996)	North-east Victoria, south-west New South Wales	Pasture management attitudes and practices	Development of perennial pasture management extension and assistance programs
Howden <i>et al.</i> (1998)	North-east Victoria, south-west New South Wales	'Farming style' <sup>b</sup>	Development of rural extension and assistance programs.
Specht and Emtage (1998)	Northern Rivers region (north-east New South Wales)	Ratings of importance for various reasons for planting trees on private landholdings	Development of farm forestry extension and assistance programs and public policies
Fulton and Race (2000)	Australia-wide	Type (size, location) of farm enterprise and landholder characteristics	Development of farm forestry extension and assistance programs and public policies
Emtage <i>et al.</i> (in prep.)	Far North Queensland	Ratings of importance for various reasons for, and restrictions to, plantation development on private landholdings	Development of farm forestry extension and assistance programs and public policies

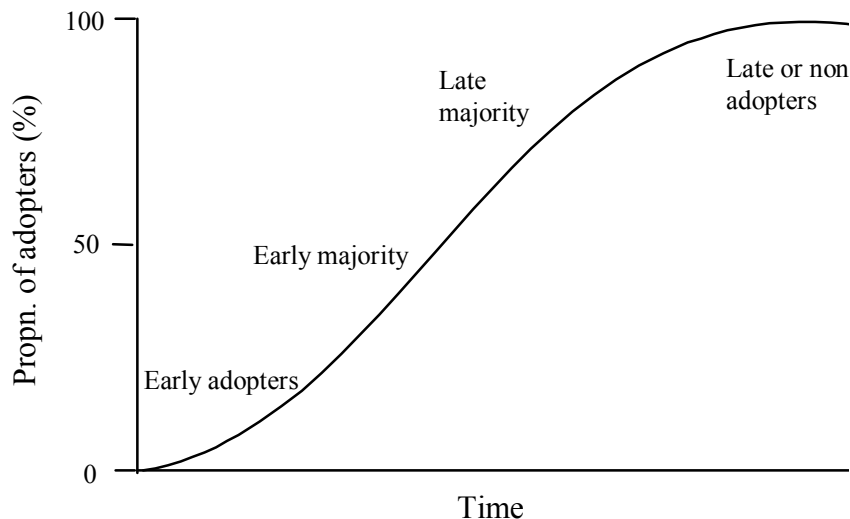
- a. 'Farming context' is a concept developed by Crouch 1981 (cited by Kaine and Lee 1994), referring to the stage of development of a farming enterprise, i.e. the degree to which a farming enterprise utilises 'innovative' or 'best' management practices.
- b. 'Farming style' is a concept developed by van der Ploeg (1990) (cited by Howden *et al.* 1998, Vanclay *et al.* 1998, Howden and Vanclay 2000), referring to the strategy of farm management adopted by a landholder.

### Grouping landholders using innovation adoption theories

The theories describing the diffusion of innovations have been used as the basis for extension practices in Australia for the last three decades. These theories apply many of the concepts developed by social psychologists in an attempt to explain the process by which new ideas become known in a

community and new practices are adopted (Rogers 1995). It is thought that there are a number of distinct types of people in a community in terms of the way they respond to new ideas and practices.

The theories of innovation adoption and social psychology describe the tendencies for people to communicate with others who share and reinforce their own world-views (Scott 1991, Spence 1994, Rogers 1995). Theories of innovation adoption also describe a common process whereby new ideas are spread through the community as illustrated in Figure 7.1. It is thought that new ideas and practices are initiated and tested first by the 'innovators', then they spread to 'early adopters' and 'opinion leaders', and finally to the 'early' and 'late' majorities (Spence 1994, Rogers 1995).



**Figure 7.1.** The S-curve of the adoption of new practices over time

Source: Rogers (1995).

Using hundreds of studies of the adoption of various innovative practices in many different countries, innovation adoption theorists have made a number of generalisations about the socioeconomic characteristics of each of these types of landholders (Rogers 1995). These generalisations are presented in Table 7.2.

Although extension sciences have been criticised for treating the rural community as a homogenous entity, through the use of innovation adoption theories they have 'in some ways invoked diversity on the basis of innovativeness' (Vanclay *et al.* 1998, p. 85). It has been argued that the application of innovation adoption theories have at times been flawed, on the grounds that '...this was not a true form of diversity because extension, at least in traditional models, presumed that innovations were universally applicable and would be universally adopted' (Vanclay *et al.* 1998, p. 85; see also see Vanclay and Lawrence 1995). This approach fails to recognise the diversity of belief systems in communities. Instead, differences in behaviour are explained as resulting from different perceptions of risk and different socio-economic circumstances.

Some of the criticism made by Vanclay and Lawrence (1995) of the use of innovation diffusion theories by extension services arises where the theories have been used as an excuse to decrease overall extension budgets by concentrating extension efforts on the 'early adopters' and 'opinion leaders' in the belief that the messages would eventually trickle down to other landholders. This would seem, however, to be a criticism of the way in which these theories are applied rather than of the theories themselves.

**Table 7.2.** Landholder types as described by innovation adoption theorists

Landholder type	Typical characteristics
Innovators	People of this type are said to like experimentation and risk taking and are termed 'venturesome'. They enjoy frequently trialling new ideas and practices. They are seen as eccentric by other landholders in terms of their ideas and behaviour. They are usually highly educated but not wealthy due to their constant changing of practices and lack of focus on wealth accumulation. They typically have a dispersed friendship network that extends beyond their local area, are keen information seekers and have the most cosmopolitan worldview.
Early adoptors	These types of landholders are often defined as the 'opinion leaders' in the community and are termed 'respectable'. They are typically relatively well educated and control landholdings of medium to large size which they may have inherited. They typically have sufficient resources to allow them to experiment with new practices. Because they have control over larger landholdings, don't deviate greatly from 'normal' practices and have a strong history of land management they have the respect of the 'majority' in the community who look to them rather than the more eccentric 'innovators' for advice and ideas.
Early majority	Landholders of this type are interested in using the most productive practices on their landholdings but typically have less resources to trial new practices and a lower capacity to translate abstract research results to local farming conditions. This group watches the activities of the 'opinion leaders' and takes up practices they believe have been successful. They can be termed 'deliberate'.
Late majority	This type of landholder is typically more conservative than the above landholder types and can be termed 'sceptical'. They prefer to see widespread adoption of a practice in their area before they are confident to adopt it. They typically have less resources than the above types for experimentation and are unwilling to adopt practices until almost all risk associated with them have been removed.
Non-adoptors	This type of landholder has been termed 'laggards' and 'traditional'. They are thought to be the most local in their worldview and poorly connected in the social system. They have a high degree of skepticism about change and change agents. Many are in tight financial circumstances and unwilling to trial new practices until all uncertainty is removed.

Source: Adapted from Rogers (1995).

### **Grouping landholders by farm enterprise structures**

Kaine and Lee (1994) sought to improve understanding of how differences between farm business enterprises affected landholders ability to adopt innovations in the cattle breeding industry. The theories underlying their work include the concepts of an agricultural knowledge and information system (AKIS) and that of farming contexts. The theory of agricultural knowledge and information system holds that knowledge about farming practices can originate from many sources including researchers, farmers and extension workers and is spread through networks. According to Kaine and Lee (1994, p. 2), the AKIS concept 'allows for multi-directional flows of information among a network of participants and for the control of the system to be shared between those mainly involved in the generation of new knowledge and those who are mainly concerned with the application of that knowledge.' The concept of AKIS is an alternative to that of linear information transfer described by innovation diffusion theorists such as that of Rogers (1995). One advantage of the AKIS concept over the linear model of diffusion is that it gives greater recognition to the potential for new practices to originate from many sources. A remaining problem according to Kaine and Lee (1994, p. 2) is that the AKIS model and other 'network' models of information diffusion '...do not explicitly allow for the

possibility that new information is not equally 'valuable to all farmers. The assumption that new information is inherently valuable will only hold to the extent that new ideas apply equally across all farming contexts.'

The concept of 'farming contexts' is drawn from the work of Crouch (1981, cited by Kaine and Lee 1994). It is taken to mean the 'resources, practices and technologies currently used by a farmer in production and the key attributes of the farmer such as his or her business and farming aspirations and objectives' (Kaine and Lee 1994, p. 2). Thus, if an innovation in farming practices will only lead to an increase in production when used in conjunction with other specific practices, then the innovation will be more valuable to those already using those other practices than those who are not. Therefore, Kaine and Lee (1994) hypothesised, the range of farming 'contexts' suitable for innovations will become more restricted as the innovations become progressively more advanced, i.e. adoption of innovations becomes an increasingly ordered and structured process.

To test this hypothesis Kaine and Lee examined the adoption of confined calving of heifers and cows by cattle breeders in southern Australia. They classified farms into five groups such that producers within each exhibited similar attitudes toward confined calving and followed similar management practices (other than confined calving). Statistical tests were used to assess whether there were differences between the proportions of each group who practice confined calving. The results of these tests revealed significant differences between groups, with one group in particular displaying a high rate of adoption of confined calving. Kaine and Lee then made a series of recommendations of how to accelerate adoption of the practice by members of the other groups based on differences between these groups and the 'progressive' group in terms of the other attributes measured in the study.

Kaine and Lee (1994) recognised the similarities between their approach and that of market segmentation and the potential utility of such an approach. They stated that:

...if farms are classified into groups on the basis of differences in production 'context', then each group could be interpreted as representing a different 'segment' in the 'market' for agricultural innovations and extension services...In short, we believe that by classifying farmers into groups or segments extension services and farm advisory services may be able to identify those groups of farmers that are more likely and less likely to adopt an innovation. Given the set of set of practices that are functionally related to a particular innovation, the mixture of practices that have been adopted will differ across segments. Armed with this information, extension organisations may design programs, based around different 'packages' of practices and techniques, which are tailored to the specific needs of segments (Kaine and Lee 1994, p. 55).

Kaine and Lee (1994) saw three additional potential applications of their research. The first is the possibility of facilitating links between farmers in similar situations (i.e. networks) within the groups or segments they identified. Such networks could assist extension services in determining the path of development required by groups members to reach the next stage in farm development. The second application is the identification of potential paths of farm development to reach the ultimate point in farm productivity and sustainability at a particular time. The third application is the potential to enable extension services to estimate better the outcome of extension programs, a task often asked of those running extension programs, yet one that it is difficult to carry out.

## **Studies of landholders using farming style theory**

Farming style theory has been proposed as an approach for conceiving and understanding diversity in agriculture. Howden *et al.* (1998) applied the concept of 'farming styles' to develop a comprehensive set of landholder types in the broadacre cropping areas of south-east Australia. Farming styles can be defined as '...socially constructed types that reflects the worldviews and strategies of one configuration of farming practices for a particular commodity (or common combination of commodities) in a particular region' (Howden and Vanclay 2000, p. 295).

Farming style theories were developed by van der Ploeg and others in Europe. These theories basically state that ‘...within a farming community there is a discrete set of styles (or strategies of farming) which farmers are acutely aware of, and from which they actively choose a specific strategy to guide their own management’ (Vanclay *et al.* 1998, p. 86). Howden and Vanclay (2000, p. 297) cited van der Ploeg (1993, p. 241) as stating:

Farming styles refers to a cultural repertoire, a composite of normative and strategic ideas about how farming should be done. A style involves a specific way of organising the farming enterprise: farmer practice and development are shaped by cultural repertoire, which are in turn tested, affirmed and if necessary adjusted through practice.

One of the criticisms of the application of farming style theories by van der Ploeg and others in Europe is the use of market orientation as a primary basis for classifying farmers into distinct styles (Vanclay *et al.* 1998, Howden and Vanclay 2000). The European group used the extent of intensification and scale of operations as the basis from which to begin classifying various farming styles. Vanclay and others argued that emic approaches (where the farmers describe themselves in their own terms) should be used rather than presenting them with word ‘portraits’ of potential styles which they rate as being like or unlike themselves. Vanclay and others attempted to modify the application of the farming styles methodologies to make them truly emic or ethnographic rather than impose ‘expert’ interpretations of farming styles onto the landholders. As these researchers reported, their efforts were only partially successful.

The aim of the research undertaken by Howden *et al.* (1998) was to ‘...test the applicability of farming styles theory in the Australian context, as a suitable classification procedure to assist in targeting of the products of agricultural research...’ (Howden *et al.* 1998, p. 109). Relatively homogenous groups of landholders were initially defined by a series of focus groups where landholders were asked to characterise themselves as farmers, to identify the way they differed from other farmers in their area, and to describe the styles of the other farmers in their area. The resulting categories of farmers defined in these focus groups were then compared and summarised by a group of public and private agronomists. While over 20 different types of farmers were identified in this process, it was concluded that more than 80% of landholders fell in six main categories (Table 7.3). It was indicated that the researchers saw the descriptions as ‘archetypes’ or ‘ideal’ representations rather than as discrete entities.

Howden and Vanclay (2000) have questioned the practicality of farming styles typologies due to differences between the findings of van der Ploeg and those of Howden *et al.* (1998), internal inconsistency in the descriptions of the types by different landholders and a lack of supporting evidence from case studies. Howden *et al.* (1998) reported that the various focus groups used different language to describe the same styles, and different focus groups described different landholder types.

The differences among farmers’ own interpretations of farming styles and the need for expert interpretation of their descriptions was taken by Howden *et al.* (1998) as indicative that the farming styles are analogous to the idea of farming sub-cultures. These authors argued that ‘... a style is possibly a sub-cultural grouping with its own socially constructed reality...(and)...the range of styles may reflect class and education differences...’ (Howden *et al.* 1998, p. 123). The primary evidence for this is the lack of common language between farming groups, with the exception being the use of ‘adopter categories’ (e.g. ‘innovative’ and ‘progressive’) as described by innovation adoption theorists. According to Howden and Vanclay (2000), these were the only styles that were not described disparagingly. Howden and Vanclay (2000) further reported that farmers were unwilling to be identified with styles that were perceived to be socially undesirable. They stated that:

The styles do exist as part of farming discourse in general terms; all farmers, and people associated with farmers, have images about farmers and farming they have constructed. They are aware, at some level, of the normative judgements applied by various groups. ... the mythologising of styles can work as a form of social control (Howden and Vanclay 2000, p. 307).

**Table 7.3.** Characteristics of different types of landholders in the broadacre cropping belt of southeast Australia developed using farming styles concepts

Category	Degree of contact with researchers and other change agents	Level of risk adopted	Key influences	Views of other landholders
Innovative	High – used to trial new practices	High – like to try new ideas	Look to the ‘big picture’	Forefront of change, take some unnecessary risks.
Progressive	High	Medium – trial ‘proven’ practices	Strong economic/business orientation	Seen by many as the ‘best’ farmers.
Middle of the road	Medium	Medium – low	Other landholders. Like the farming ‘way-of-life’, have inherited land.	Seen as ‘average’, follow-on’ or ‘practical’ farmers.
Lifestyler	Medium-low	High – low	Personal approaches; some new to land, others are retired farmers.	Adopt ‘strange’ management. Annoying if they challenge neighbours’ practices or fail to control weeds.
Resource limited-structural	Medium – low	Low	Small and often unviable farm size. Low financial and information capital limits practices.	Some lack of business skills and ability to cope with new information.
Traditional	Low	Low	Follow well-known practices, often those of their parents.	Seen as ‘old-fashioned’, living in the past.

Source: Based on Howden *et al.* (1998).

Howden and Vanclay (2000) have also reported on a re-examination of the groups of landholders using a series of case studies. When they attempted to locate specific examples of the various groups to use for case studies, the extension agents who were assisting them had considerable difficulty in naming actual farmers to exemplify many of the categories. Howden and Vanclay (2000) reported that the farmers were frequently able to identify with aspects of a number of different styles, sometimes selecting seeming opposing styles as ‘most like themselves’ during the case study interviews. The extension agents and farmers still thought, however, that the notion of farming styles is valid.

Howden and Vanclay (2000, p. 308) stated that ‘to some extent, the heuristic styles represent dimensions or continua on which farmers locate themselves (although subconsciously), and for which a mythologised style, or parable, is a characterisation of a polar extreme.’ Thus they concluded that the styles they had described were in fact myths or stereotypical constructs in which landholders saw elements of themselves and selected parts to emulate in devising their individual strategies rather the styles being descriptions of actual people or management strategies. They did not totally reject the concept of farming styles and the potential this has to understand better the sociology of Australian agriculture. They concluded that the current limitations of the concept are more of a methodological problem and that ‘focus groups are not an appropriate technique for identifying “real” tangible farming styles, which may or may not exist’ (Howden and Vanclay 2000, p. 309).

### Existence of farming sub-cultures

Another theoretical basis for examining the variations in land management attitudes and practices is the application of the idea of farming sub-cultures as described by Vanclay and others (Vanclay 1995,



Vanclay and Lawrence 1995). The concept of farming sub-cultures is similar to that of farming styles. Farming sub-cultures are said to be a collection of landholders who share similar concepts of what is involved in 'good land management'. The concept of 'good land management' differs between landholders, being socially constructed and defined through interaction between farmers, through participation in extension activities, and through the rural media (Howden and Vanclay 2000, p. 297).

One difference between farming styles and farming sub-cultures is in terms of the degree to which it is thought that landholders' decisions are influenced by factors outside of their control. Howden and Vanclay (2000) argued that farming style theorists place too great an emphasis on the degree to which people are free to control their own behaviour in the face of political, economic and environmental factors that are beyond their control. Instead they argued that all peoples' actions are guided to some extent by sub-cultural norms as well as political, economic and environmental factors, together with individual rationality. They stated that it is normal and rational for people to act to achieve their goals in a way that avoids social ostracism even if this may be maladaptive in terms of maintaining their landholding in the face of political or environmental change. No full explanation of the concept of farming sub-cultures by Vanclay has been found nor any typology of the farming sub-cultures in Australia in the literature review for this study.

### **Market segmentation analysis**

Previous research has identified the potential for the use of some of the techniques employed by market segment research to assist those designing and administering rural development programs (Chamala 1987, Vanclay *et al.* 1998), although little has been published about the approach (Emtage 1995, Emtage and Specht 1996). Market segmentation is an analysis technique used by commercial firms to guide their marketing strategies and resource allocation between products and markets (Dillon *et al.* 1990). In this sense, market segments are groups of consumers who respond to a given marketing strategy in a similar manner, or who exhibit differing sensitivities to some marketing-mix element. Market segmentation can be used, for example, to assess how various types of people will respond to new packaging or advertising, or to a new product. It is suggested that market segmentation is a necessary part of any effective marketing strategy, because products cannot be correctly 'positioned' in a market, or targeted to particular groups of consumers, if the reactions of different parts of the market to different products and marketing strategies is unknown (Dillon *et al.* 1990).

Market segmentation methods were used by Barr (1996) to examine the potential adoption of perennial pastures. Barr (1996) examined landholders reactions to perennial pastures as a 'product'. The perceived benefits of the various uses for trees on private lands were used as the basis for clustering respondents by Specht and Emtage (1998) and Emtage *et al.* (2001). Analysis of variance and chi-square tests were then used to define differences in the tree-planting attitudes and the socio-economic characteristics of each group.

### **Landholder typologies defined according to strategies for management of perennial pasture**

Barr (1996) described a typology of landholders derived from an examination of 22 studies (including five segmentation studies) of landholders' pasture management attitudes and practices in northern Victoria and southern New South Wales. The research methods used for that paper are similar to market structure analyses. The 'product' was taken to be perennial pastures and Barr examined how various types of landholders have used perennial pastures in the past and will respond to different extension messages in the future. The studies that did not use segmentation were used to supplement the information gleaned from the segmentation studies. Barr looked for consistencies among the findings of the segmentation studies and identified seven distinct groups of landholders with different socio-economic characteristics, and different attitudes and approaches to land management (Table 7.4).

**Table 7.4.** Typical landholder types in the northern Victoria – south-west New South Wales region

Landholder group	Level of risk	Key influences	Farm practices	Proportion of sample
The committed	Medium to high	Keen information gatherers and high awareness able to translate into behavioural change. High interest in production and profit	Use perennial pastures and rotational and strategic grazing routinely. Good understanding of production agriculture	5 – 15%
The pasture dabblers	Medium	Have off-farm work or business interests for financial security. Information and time poor.	Only third or less of land under perennial pasture. Active cropping.	15%
The crop focussed	Medium to high	Intent on cropping.	Use pasture to rest crop land. No perennial pastures.	Only in mixed-crop zones.
The belt tighteners	Low	Follow commodity trade closely. Risk adverse. Translate awareness to action (trials) before attitude change.	Mainly grazing, set stocking used. Overstate their level of perennial pastures.	30 – 40%
The sceptics	Low	Often have large landholding. Low trust in ‘outside’ information	Low set stocking rate, no perennial pastures	10 – 20%
The comfortable group	Low	Older people with no beneficiaries, large holdings. Seek to reduce active management.	Low energy management. Often in beef production.	20 – 40%
The retreatists	Low to high	Younger people with families. Very little time. High interest in aesthetics. Some interest in capital gains. Near urban areas.	Little interest in pasture improvement. Greater than average interest in tree planting.	Little available data.

Source: Adapted from Barr (1996).

Barr (1996) concentrated on the implications of using the understanding of various landholders types to anticipate the likely adoption of low-input pastures. He did not explicitly address the rationale for using such an approach or discuss the implications for rural extension in general terms. He argued that the various levels of enthusiasm for and adoption of perennial pastures by landholders in various ‘groups’ are rational given their social and economic circumstances. He noted differences in groups with regard to stage of life-cycle and differences in terms of the area of land owned and the extent of reliance on the farm for income. For example the ‘comfortable group’ are those who have reasonably large farms and are becoming older with no prospects of inter-generational transfer of the farm and thus they are seeking to minimise the labour demands of farm management. Their situation contrasts with the ‘retreatists’ who live near urban areas, have a heavy reliance on off-farm income and young families so that they also have limited opportunities to carry out management activities. This group also has different management objectives, being more interested in activities such as tree planting which have the prospect of capital gain through improvement of amenity values as well as timber production.

Barr (1996) reported that some of the studies he reviewed revealed differences in the decision-making process used by the various landholder groups and differences in their information-seeking behaviour. For example the ‘committed’ landholders were thought to have a confident and information-rich decision-making style where awareness of an innovation in land management practices leads to

attitude change which then leads to a behavioural change. This contrasts with the ‘belt-tighteners’ whose adoption of innovations is characterised by awareness leading to behavioural change (i.e. testing new ideas) which then leads to an attitude change. The ‘committed’ group were also noted to be the most keen to seek out new information. The other factor that is emphasised as differing between the groups is their attitudes to risk. Again the committed group are reported to be the best equipped to deal with risk through the gathering of information as well as through ownership of reasonably large farms. The ‘sceptics’ on the other hand are reported to be highly risk adverse, and because of their control of large properties, use conservative farming methods that do not necessarily maximise economic returns on a per hectare basis.

### **7.3 Landholder Types in Relation to Tree Planting and Management**

A number of authors have discussed the application of ‘user groups’ or ‘typologies’ to ensure effective design and implementation of agroforestry and agriculture development programs (Belsky 1984, Chamala 1987, Ooi 1987, Raintree 1991, Vanclay and Lawrence 1995, Vanclay *et al.* 1998, Emtage *et al.* 2001, Fulton and Race 2001). Raintree (1991), following Rocheleau (1986), applied the term ‘user groups’. This approach was developed as part of the need to develop what was termed a ‘users perspective’.

The rationale for defining different user groups within the community is that they have different attitudes and values, are in different socioeconomic circumstances, and thus have different needs and wants. In relation to the adoption of farm and community forestry, Raintree (1991, p. 8) stated ‘It is ... obvious that the different uses of trees have different degrees of relevance to different users and that the socioeconomic attributes the individual user (as conditioned by his or her position within the social structure) must somehow influence and set limits on the relevance of particular trees.’ Raintree (1991) recommended the definition of a set of internally homogenous user groups as a starting point for the design of any agroforestry systems. Tree growing technologies can then be matched to the user groups, and finally tree species to the technologies. Table 7.5 summarises various ways that landholders can be classed, including by tenure and type of production, by landholding size, by farming system type, by economic orientation and by type of participation. As well as foresters and farmers, the table includes processor, vendors and consumers classifications.

The basis of the typologies developed by Emtage and others is to group together landholders with similar attitudes to farm forestry. The clustering is based on ratings of the importance of various reasons for and restrictions to tree planting and management in the Northern Rivers of New South Wales and Far North Queensland (Emtage 1995, Specht and Emtage 1998, Emtage and Specht 1998, Emtage *et al.* 1991). The landholder groups in New South Wales and Far North Queensland were then tested to assess whether they differed in terms of their average socioeconomic characteristics and planting behaviour. In these studies, five types of landholders are described which differ significantly in their attitudes to farm forestry and in some socioeconomic characteristics. The types range from landholders on relatively large properties with a long history of land management and a low interest in tree growing, to those on smaller properties with shorter periods of land management and high interest in tree growing.

The typology of landholders was tested in the Northern Rivers region using a series of interviews with members of each different landholder type. These types were defined using responses to questions relating to the importance of planting and managing trees for various purposes in an earlier questionnaire. Specifically, five interviews were carried out with members of each type plus five interviews with respondents who were not classified in a group, using the clustering method (Emtage and Specht 1998). These interviews largely confirmed the understanding of the characteristics of the distinct types and provided further insight into their land management strategies and the potential role of tree planting and management. In the Far North Queensland study, Emtage *et al.* (in prep.) presented the results of a landholder survey to a group of farm forestry extension personnel. Prior to being shown the results of the cluster analysis and subsequent analyses to examine the characteristics

**Table 7.5.** Some methods of defining the forest users and farm and community forestry clientele

User category	Comments
<b>Producers</b>	
Forest producers	
By tenure/type of forest production	
Foresters	Professional foresters, private forest owners, etc
Traditional forest users	Hunters, foragers, shifting cultivators, herders etc
Encroachers, poachers etc	Illegal in formal law but may have rights in common law
Forest labourers	Paid for labour, may engage in other exploitative activities
<b>Farmers</b>	
By size of landholding:	
Medium-large farmers	Exact size limits vary from area to area
Small farmers	Exact size limits vary from area to area
Landless and marginal farmers	Depend on wage labour and gathering
By farming system type:	
Long-fallow shifting cultivation	R-value $\leq 10$ (see note below)
Bush fallow cultivation	R-value 10-33
Short fallow cultivation	R-value 33-66
Permanent arable cropping	Field cropped annually
Multiple cropping	More than one crop/year
Perennial crop plantation	Usually tree crops, often internationally traded commodities
By economic orientation:	
Subsistence	Production for own consumption or informal exchange
Mixed or 'subsistence plus'	Most common orientation of small farmers
Commercial	Production for cash sale
By type of tenure/participation:	
Land owner	Freeholder, owner operator, absentee landowner etc
Usufruct right holder	Tenure usually secure but rights limited
Tenant	All forms of rent, lease or sharecropping
Borrower	Based on informal reciprocity rather than formal exchange
Farm labourer	Full or part-time, continuous or temporary
Squatter	illegal occupier but some rights usually recognised
Livestock producers:	
Ranchers	modern commercial extensive range management
Pastoralists	traditional nomadic, semi-nomadic or transhumant herders
Agropastoralists	part time herding in combination with cropping
Mixed farmers	limited livestock production closely integrated with cropping
<b>Processors</b>	
Urban industry:	Located in cities or large towns
Modern, formal sector	Large-scale, high tech industries like pulp, rayon, chemicals
Traditional, informal sector	Small to medium-scale artisans and workshops
Rural industry located in rural areas, villages or small towns:	
Medium-scale	Usually modestly capitalised and labour intensive
Small-scale	Cottage or small-scale group enterprises providing full or part-time employment
<b>Vendors</b>	
Formal sector	Medium/large scale, adequate working capital and storage
Informal sector	Small/medium scale, lack of capital and storage
<b>Consumers</b>	
Urban	Large politically influential populations
Rural	Farmers, rural industry workers, retired persons and members of the remittance economy

Note: the R-value classifications are based on Ruthenburg (1971), cited in Raintree (1991).

R-value = (cropping period + (crop + fallow period))  $\times$  100. This is equivalent to the percentage of land in cultivation at any one time.

Source: Raintree (1991).

of each group and differences between groups, the extension personnel were asked to define and briefly describe common types of landholders in the north Queensland region. Table 7.6 illustrates these groups. The extension personnel were then shown the results of the cluster analysis and split into three teams to assess if the groups they had earlier defined matched the groups found through cluster analysis. They were also asked to recommend communication strategies and incentive programs that might appeal to members of the various groups.

The ‘retired professionals and hobby farmers’ groups and the ‘traditional’ group appear to represent the extreme positions of landholder types. They have the smallest and the largest landholdings respectively, and are at the extremes of the range in the proportion of income from the landholding, and the length of time over which the landholding has been managed. Furthermore, ‘retired professionals and hobby farmers’ have the lowest proportion of their land used for cropping, the highest proportion under native forest, and the least average hours per week labour input from the family (Emtage *et al.*, in prep.). As well, this type has the highest level of past tree planting activity, and the highest proportion who intend to plant trees for mixed timber production, aesthetic and environmental reasons in the future (Emtage *et al.*, in prep.).

**Table 7.6.** Classification of landholder types in the north Queensland region by farm forestry extension personnel

Group name	Key characteristics
Progressive second generation farmers	Have inherited land (and debt); have similar enterprises as parents but greater education, more emphasise on conservation farming.
High intensity farmers	Very commercially orientated, often involved in banana growing and or sugar crops, seek to maximise land under crops.
Traditional farmers	Follow old style farming practices, large land size.
Retired professionals	People with high education and strong financial position who retire to the land as a lifestyle choice.
Experienced/ comfortable farmers	Largely debt-free, older, running profitable landholdings with minimal direct labour inputs (i.e. use contractors regularly).
Absentee landholders	Often become retired professionals with high incomes and education, little time. Often use land as tax break, frequently employ managers. Considerable variation in strategies used.
Marginal farmers	On poorer quality land running marginally profitable enterprises. Many desperately seeking information and /or methods that will allow them to run the landholding profitably.
Hobby farmers	Smaller landholdings providing small proportions of landowners income. Frequently well educated and in ‘good’ jobs but with considerable variation.
Conservationists	Land management dominated by very strong conservation ethic.

Source: Emtage *et al.* (in prep.)

Fulton and Race (2000) strongly supported the technique of using broadly defined groups of landholders to assist the development of strategies to increase participation in farm forestry activities. Their rationale for doing so differs slightly from the approach taken by Emtage and others. They argued that the main purpose of identifying such types is to assist government and industry to identify which types of landholders are most likely to adopt farm forestry. The advantage of this approach, they argued, is that it can make the extension programs more efficient by targeting specific types of landholders (Fulton and Race 2000). Emtage and others have argued on the other hand that the identification of types with differing social values and socio-economic circumstances should be used to ensure that the differing requirements of the various landholder types are being catered for by public assistance and development schemes. That is, they have argued that the identification of landholder types should be used to ensure that public programs are inclusive of a greater range of

landholders rather than seek to make them more exclusive. They have also argued that such groups can be used to assist in the development of regional conservation strategies (Emtage and Specht 1998).

Fulton and Race (2000) developed a guide typology of landholders which matches these types with various sectors in the timber industry, alternative plantation designs and various potential marketing arrangements, as presented in Table 7.7. The typology is intended as a guide only, and Fulton and Race (2000) stated that regional studies are required to identify local variations. Note that the landholders include all those who could potentially be involved in the development of timber plantations on private and public land including urban investors and municipal governments.

**Table 7.7.** Typology of farm forestry landholders and industries

Industry	Landholder	Marketing arrangement	Design
Small-scale specialty timber sawmill	Commercial farmers with some silvicultural experience; Small-scale landholders.	Market brokers.	Timberbelts; small woodlots (1-5 ha).
Medium-scale hardwood sawmill	Commercial farmers with considerable forestry expertise; Small-scale urban investors.	Grower cooperative; Forest management team; 'Marketing' joint ventures.	Timberbelts; woodlots (2-10 ha).
Large-scale integrated softwood and MDF mill	Commercial farmers with under-utilised land; Small-scale urban investors; Corporations and government with under-utilised land.	Joint ventures with industry sharing the establishment costs and undertaking much of the forest management; Grower cooperatives; Forest management team.	Woodlots and small plantations (10-40 ha).
Large-scale pulpwood mill	Commercial farmers with under-utilised land; retiring farmers; Corporations and government with under-utilised land; urban investors.	'Lease' joint ventures; Grower cooperatives; forest management team; market broker.	Wide timberbelts, woodlots and plantations (10-100 ha).

Source: Fulton and Race (2000).

## 7.4 Comparing Landholder Typologies

Comparison of the groups defined through cluster analysis of landholders rating for reasons for planting trees by Emtage and others with the groups identified according to pasture management by Barr (1996), according to 'farming styles' by Howden *et al.* (1998), and with groups identified by innovation adoption theorists, shows remarkable similarity in their socio-economic characteristics (Table 7.8). Researchers from different institutions, looking at different aspects of land management, and using different theoretical bases, developed the typologies separately. The typologies described by Barr (1996), Howden *et al.* (1998), Specht and Emtage (1998) and Emtage *et al.* (in prep.) all include a traditional or conservative type, a smallholder or hobby farmer type, a progressive type, a resource limited type and a comfortable type. The socioeconomic characteristics of these typologies appear to be similar to the ideal types described by innovation adoption theorists. This suggests that landholder types identified by the aforementioned studies and the theories of innovation adoption have the same basis.

There are several socioeconomic factors that have been reported to differentiate between the landholder types in all of these studies. These factors include the economic characteristics of the landholding such as size and productivity and the degree of dependence of the landholder on the property for income, social characteristics such as the history of family ownership of a landholding and the family size, structure and time in life-cycle, and personal characteristics such as the level of formal education. Landholders' attitudes to land management issues such as the legitimate role of governments and the relative importance of biodiversity conservation are likewise similar between similar landholder types described by different authors.

Vanclay (1995), Howden and Vanclay (2000) and Vanclay *et al.* (1998) discussed the theoretical perspectives that underlie the studies that have been reviewed in this paper. Howden *et al.* (1998) aimed to produce landholders own descriptions of landholder types but were forced to use 'experts' to interpret the farmer descriptions they gathered using workshops. Specht and Emtage (1998) adopted the names of the main landholder types described by Howden *et al.* (1998) because names were needed and these appeared to match the essential characteristics of the landholder types defined in the Northern Rivers region. Emtage *et al.* (2001) used a group of practicing extension personnel to aid the interpretation of their study, as well as to communicate the results of the survey to them. Barr (1996) was able to apply names to the groups he described without the use of terms that are applied by innovation adoption theorists. Nevertheless, the types described by Barr (1996) appear similar to those described by innovation adoption theorists.

**Table 7.8.** Names of groups from previous studies of farming styles, innovation adoption and market segments

Group – Barr (1996)	Style – Howden <i>et al.</i> (1998)	Group name – Emtage <i>et al.</i> (in prep.)	Innovation adoption categories
The committed	Progressives/ innovators	Progressive second generation	Early adopters
The pasture dabblers	Lifestylers	Retired professionals, hobby farmers, absentee farmers	↓ Early majority
The crop focussed	Diesel burners	High intensity	↓
The belt tighteners	Resource limited – structural, middle of the road	Marginal	Late majority
The comfortable group	Middle of the road	Experienced/ comfortable	↓
The sceptics	Traditional	Traditional	Late or non-adopters
The retreatists	Lifestyler	Retired professionals, hobby farmers, absentee farmers	Varied

A number of implications arise from the findings of these studies. All of the researchers stress the utility of segmentation techniques to help understand and describe the range community attitudes and socioeconomic circumstances in the community and the way these attitudes and circumstances influence land management behaviour. The methodology applied to define the typologies has varied between studies from market structure and enterprise structure analyses, to quantitative and qualitative surveys, varying according to the objective of the research. Where the research has been industry focused, such as the studies of Kaine and Lee (1994) and that of Fulton and Race (2000), the needs of the research sponsor can affect the choice of methods used to ensure industry requirements are met. In the case of the beef industry and the timber industry, knowing which types of landholders are likely to have compatible objectives and business structures that suit them for specific roles in these industries

can greatly assist industry in developing partnerships with landholders, and developing communication and strategic plans for the industry members. In other cases, the aim of the research has been to illustrate the diversity of landholders in the rural community to assist in the promotion of sustainable land management practices (Barr 1996, Specht and Emtage 1998, Howden *et al.* 1998, Emtage *et al.* in prep.). These studies have produced landholder typologies that try to illustrate the full range of landholder variation on the rationale that because landholders are in differing economic circumstances and have differing value systems, policies and programs will have differing impacts upon them. These authors argue that public policies need to take account of these variations in order to be efficient and to ensure social equity.

The definition of landholder types can be imposed according to one or more identifiable characteristic, including characteristics of the landholding, or based on psychographic or attitudinal data collected using surveys. One of the most useful outcomes of applying segmentation techniques is the insight they provide into the way that personal, social and economic characteristics combine to produce different land management objectives and strategies.

The similarities of the landholder types described in the studies raises the question of whether these 'ideal types' are representative of fundamental social units in the rural community. Not only were the studies undertaken using differing techniques, but also they cover several dissimilar regions in Australia. Are they self-perpetuating 'cultures' or 'sub-cultures', with shared belief systems, characteristic behaviour patterns and identifiable icons or 'social classes'? The similarities in land management attitudes and practices across age groups reinforces theories holding that landholders learn their practices from their families and those in their social group. Various sub-cultures or classes in society have different perceptions of the importance of various issues and the 'correct way' to respond to them. Their objectives for land management are related to their economic circumstances and their personal skills as well as the state of the economy and environment around them. Their land management objectives are also partly determined by their value system, which in turn is affected by their family and peers.

The notion of what is meant by the term 'good land management' varies between landholders, as Vanclay (1995) has argued. Understanding the influence of the socially constructed ideals of 'agrarianism' and 'conservation' could be important in helping to understand the reason why people in similar circumstances in terms of their land resources act in different ways to the same responses. It appeared from the qualitative parts of the studies in the northern rivers region that two fundamental philosophies of land management existed (Emtage and Specht 1998b). The first was the traditional ideal of 'agrarianism' that emphasised the importance and nobility of productive farming in a manner that does not degrade the environment. The second ideal was the newer concept of 'conservationism' which emphasises the aesthetic and biodiversity conservation values of land management. Most people appeared to fall in between the two extreme positions but these extremes appear to provide ideal or at least stereotypical reference points for many in the community, and there were a few people who expressed what may be termed 'classic' expressions of these extremes.

There is reason to believe that the landholder typologies that have been described could be used to assist land management extension planning at a national scale. Fulton and Race (2000) cautioned that the regional differences in landholder types and circumstances are great enough to warrant the need for assessment of landholder variation in each region. Specht and Emtage (1998) also concluded that studies of landholders' land management attitudes and behaviour is most appropriate at a regional scale, partly because the environmental and market access conditions are less varied at this scale. Yet the comparison of studies undertaken in a variety of regions shows there are many similarities in landholder types across regions. These similarities may be a chance for public land management agencies to develop a more sophisticated database of land management approaches in Australia to assist the design and implementation of rural policies in areas such as biodiversity conservation. It may be possible to develop some indicators of the various landholder types that would help to speed up the development of the understanding of landholders management approaches in regions that have not yet been extensively studied.



## 7.5 Conclusions

It is clear that many Australian researchers interested in rural extension see a role for landholder typologies to assist in the design and delivery of extension programs. As outlined in this chapter, various methods can be used to construct landholder typologies. These methods vary according to the theoretical approach used by the researcher and the purpose of the research. The main function of typologies is to improve the understanding and description of the diversity of landholders' values, attitudes, behaviour and socioeconomic circumstances in rural communities. The application of typologies offers the opportunity to improve the efficiency of extension programs through greater understanding of the circumstances in which landholders are operating and the potential to thus tailor the programs to specific needs and to target communications. For private industries seeking partnerships with specific types of landholders, typologies can assist in identifying the landholders of interest and ways to design the programs to stimulate landholders' interest. In the public sphere the application of typologies offers the chance to improve the equity of extension programs by explicitly describing variation in the community and designing programs to suit. It can be argued that typologies are artificial in that it can be difficult to identify specific examples of various types as reported by Howden *et al.* (1998). In response it can be argued that the similarities in the landholder typologies, which were developed independent of each other using a variety of methods and approaches, suggests that they are reflective of fundamental variations between landholders within regions throughout rural Australia.

It is concluded that the limitations of typologies should be remembered and typologies should not be expected to represent every variation of landholders in a community. Typologies can potentially assist in the design of extension programs at regional and possibly at national levels where their application offers distinct advantages over the use of simple averages to describe the characteristics of rural landholders. While typologies can assist industries to target specific landholders and can assist the development of suites of programs to address common issues, they cannot replace the need for those offering advice to landholders to develop an understanding of the landholders' individual circumstances. It can only be hoped that the use of typologies will lead to the development of suites of public and private extension programs that are tailored to the variety of needs and circumstances of landholders. Once suites of programs are available, or variation in programs is enabled to account for variations in the needs and circumstances, it will then be up to the landholders and their advisors to select appropriate programs for their own needs.

## References

- Commonwealth of Australia (1990), 'Ecologically sustainable development', a Commonwealth discussion paper, Australian Government Publishing Service, Canberra.
- Commonwealth of Australia (1992), *National Strategy for Ecologically Sustainable Development*, Australian Government Publishing Service, Canberra.
- Barr, N. (1996), 'Conventional and low-input pasture improvement – a review of recent market research', *New Zealand Journal of Agricultural Research*, 39: 559-567.
- Boyd, H.W., Westfall, R. and Stasch, S.F. (1989), *Marketing Research*, Irwin, Boston.
- Byron, N. and Boutland, A. (1987), 'Rethinking private forestry in Australia', *Australian Forestry*, 50(4): 236-252.
- Chamala, S., Van den Ban, A.W. and Roling, N. (1980), 'A new look at adopter categories and an alternative proposal for target grouping of farming community', *Indian Journal of Extension Education*, 16(1&2): 1-18.
- Chamala, S. (1987), 'Strategies to overcome communication deficiencies in achieving sustainable farming systems', *The Journal of the Australian Institute for Agricultural Science*, 53(3): 164-169.
- Dargavel, J., Jackson, G. and Tracey, J. (1995), 'Environmental events in the forests of northern New South Wales: a second order', *Australian Journal of Environmental Management*, 2(1): 224-233.

- Dillon, W.R., Madden, T.J. and Firtle, N.H. (1990), *Marketing Research in a Marketing Environment*, Irwin, Boston.
- Emtage, N. (1995), *Landholders' Perceptions of Planting and Managing Trees*, B.App.Sci. Hons. thesis, Faculty of Resource Science and Management, Southern Cross University, Lismore.
- Emtage, N., J. Herbohn, S. Harrison and D. Smorfitt (in prep.), *Landholders' Perceptions of Plantation Development in Far North Queensland*.
- Emtage, N.F. and Specht, A. (1998a), 'Landholders' perceptions of farm forestry in the northern rivers region of New South Wales', in *Plantations and Regrowth Forestry: a Diversity of Opportunities*, in R. Dyason, L. Dyason and R. Garsden, eds., Proceedings of the Biennial Conference of the Australian Forest Growers, Southern Cross University, Lismore, pp. 345-369.
- Emtage, N.F. and Specht, A. (1998b), *Landholders' Perceptions of Farm Forestry in the Northern Rivers Region of New South Wales: Overview Report*, Report to the Northern Rivers Regional Plantation Committee, Ballina.
- Fulton, A. and Race, D. (2001), 'Farm forestry in Australia: why do landholders get involved? In *Developing Policies to Encourage Small-Scale Forestry*, in J.L. Herbohn, et al., eds., proceedings of the Kuranda IUFRO group 3.08 Small-scale Forestry conference, School of Natural and Rural Systems Management, The University of Queensland, Brisbane.
- Gibbs, D.M.H. (1992), 'Economic impacts of the New South Wales Rainforest Policy Decision of 1982 on the timber industry of the Far North Coast', *Australian Forestry*, 55: 80-89.
- Guerin, T.F. (1999), 'An Australian perspective on the constraints to the transfer and adoption of innovations in land management', *Environmental Conservation*, 26(4): 289-304.
- Harrison, S.R., Herbohn, J.L. Emtage, N.F. and Smorfitt D. (1998), 'Landholder attitudes to farm forestry incentive schemes in north Queensland', Proceedings of the *Managing and Growing Trees Conference*, Kooralbyn.
- Harrison, S.R., Sharma, P.C. and Lamb, D. (1994), 'Progress in farm forestry in the Obi Obi Valley', Paper presented to the *Farm and Community Forestry Seminar*, Dorrroughby Field Studies Centre, Dorrroughby.
- Herbohn, K.F., Herbohn, J.L. and Harrison, S.R. (1998), 'A spectrum of small scale forestry initiatives in Australia: The role of environmental versus commercial values', *Integrating Environmental Values into Small Scale Forestry*, IUFRO Symposium, Vancouver, 16-20 August 1998.
- Howden, P., Vanclay, F. Lemerie, D. and Kent, J. (1998), 'Working with the grain: farming styles amongst Australian broadacre croppers', *Rural Society*, 8(2), 109-127.
- Howden, P. and Vanclay, F. (2000), 'The mythologisation of farming styles in Australian broadacre cropping', *Rural Sociology*, 65(2): 295-310.
- Kaine, G.W. and Lee, J.W. (1994), *Patterns in Innovation: An Analysis of the Adoption of Practices in the Cattle Breeding Industry*, The Rural Development Centre, University of New England, Armidale.
- Race, D. (1999), 'Regional farm forestry industries: potential dimensions and possible outcomes', *Australian Forestry*, 62(2): 182-192.
- Reeve, I. (1994), 'Property and participation: an institutional analysis of rural resource management and Landcare in Australia', *Rural Society*, 4(2): 25-35.
- Raintree, J.B. (1987), 'The state of the art of agroforestry diagnosis and design', *Agroforestry systems*, 5: 219-250.
- Raintree, J.B. (1991), *Socioeconomic Attributes of Trees and Tree Planting Practices*, Food and Agriculture Organisation of the United Nations, Rome.
- Rogers, E.M. (1988), *Social Change in Rural Societies: An Introduction to Rural Sociology*, Prentice-Hall, New Jersey.
- Rogers, E.M. (1995), *Diffusion of Innovations*, The Free Press, New York.
- Scott, J. (1991), *Social Network Analysis: a Handbook*, Sage, London.
- Specht, A. and Emtage, N.F. (1998), *Landholders' Perceptions of Farm Forestry in the Northern Rivers Region of New South Wales*, report to the Northern Rivers Regional Plantation Committee, Ballina.
- Spence, W.R. (1994), *Innovation: The Communication of Change in Ideas, Practices and Products*, Chapman and Hall, Melbourne.

- Stewart, A. and Reid, R. (1994), 'The design and development of agroforestry and farm forestry options to match farmer needs in the Otway ranges', in *Faces of Farm Forestry*, Proceedings of the 1994 Australian Forest Growers Conference, Launceston.
- Vanclay F. (1995), 'Actors and structures in Agriculture: reflections of an Australian in Wageningen', in F. Vanclay, ed., *With a Rural Focus: TASA '94 Conference proceedings*, Centre for Rural Social Research, Charles Stuart University, Wagga Wagga, pp. 89-128.
- Vanclay, F.M. and Lawrence, G. (1995), *The Environmental Imperative: Eco-social Concerns for Australian Agriculture*, Central Queensland University Press, Rockhampton.
- Vanclay, F., Mesiti, L. and Howden, P. (1998), 'Styles of farming and farming sub-cultures: appropriate concepts for Australian rural sociology?', *Rural Society*, 8(2): 85-108.
- Van den Ban, A.W. and Hawkins, H.S. (1996), *Agricultural Extension*, Blackwell Science, London.
- Wilson, G. A. (1992), 'A survey of landholders to native forest on farmland', *Journal of Environmental Management*, 34: 117-136.
- Wilson, S.M. and Yannick, D.T. (1995), *Trees on Farms: Survey of Trees on Australian Farms: 1993-4*, ABARE Research Report 95.7, ABARE, Canberra.