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Social principles for agricultural extension to assist in the promotion of natural resource management

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Abstract. An understanding of social issues, the social nature of farming, and the social basis of adoption is needed if agricultural extension is to be effective in addressing natural resource management issues, and in promoting sustainability in its triple bottom line conceptualisation. Twenty-seven principles are presented here, with the key principles being: awareness of farming as a social activity; recognition of the social diversity of farmers and the social drivers in agriculture; and the socio-cultural basis of adoption.

Additional keywords: rural sociology, farming, barriers to adoption, social drivers.

Introduction

Agriculture has too long been thought of as a technical issue involving the application of science, and the transference of the outputs of that science via a top-down process of technology transfer. It is not. Agriculture is farming, and farming is people. The survival of agriculture is dependent on the survival of viable rural communities. Sustainability has multiple bottom line implications, containing environmental, social and economic dimensions. The criteria and indicators for sustainability in a physical sense are generally understood. The economic indicators are also well established, although rather limited. What is lacking is an awareness of the social issues. This paper seeks to outline the key social principles relevant to the promotion of natural resource management issues in agriculture. These social principles should augment technical and economic principles relevant to sustainable agriculture.

The principles were developed out of personal reflection on 20 years of research on the social dimensions of farming particularly as they relate to the promotion of natural resource management in agriculture. This research started with a Masters degree (Vanclay 1986), continued through a PhD (Vanclay 1994), and through subsequent supervision of PhD students including Lockie (1996), Howden (2001) and several that are as yet not complete. It includes work as a research assistant (Rickson *et al*. 1987), research fellow (Vanclay and Cary 1989), principal investigator or consultant (Vanclay 1993, 1998; Vanclay and Lockie 1993; Vanclay and Glyde 1994; Lockie *et al*. 1995; Vanclay and Hely 1997) and supervisor (Glyde and Vanclay 1996; Howden and Vanclay 2000). Throughout this period, the ideas have changed and consolidated, and they have been aired at many conferences, including some of the first conferences in technical areas to consider social issues in agriculture and natural resource management (Vanclay 1991*a*, 1991*b*, 1992*b*, 1999). Some of the publications that have come out of this research provide evidence for statements made in this paper. However, in most cases, the principles that are articulated cannot be substantiated easily with evidence of the sort that physical agricultural scientists are used to. This is partly because this is a review paper rather than original work, but it also reflects the different epistemological paradigm of the social sciences.

They are called ‘principles’ because they are intended to be regarded as ‘a general law or doctrine that is used as a basis of reasoning or a guide to action or behaviour’ (The Australian Oxford Paperback Dictionary 1989). This status may not be accorded to them by all agricultural scientists, but they do have that status from a rural sociological perspective. It is the argument of this paper that agricultural scientists should accept these statements as principles.

Principle 1. Farming is a socio-cultural practice

The first principle is to acknowledge that farming is a socio-cultural practice rather than just a technical activity. Farming becomes a way of life, a way of making a living, that acquires a meaning far deeper that almost any other occupational identity. In that sense, farming is a vocation. As a socio-cultural practice, it is governed, informed and regulated by social processes. Being aware of this fact, and reflectively thinking about what this understanding means will assist in the promotion of a sustainable agriculture for Australia’s future.

Principle 2. Farmers are not all the same

The farming community is not homogeneous. There are many ways in which diversity can be observed within the farming community: rich and poor; big and small; old and

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young; early in the life cycle or late in the life cycle; high mortgage and small mortgage; propensity to adopt new ideas (innovator) and propensity to retain tried and true methods ('laggard' in extension discourse); and pro-chemical (or pro-GMO) and anti-chemical (or anti-GMO). Farmers can be categorised on every single variable that can be logically considered in conjunction with agriculture. This means there are no single problems, no single solutions, no single extension strategies, and no best medium that extension should solely utilise.

Instead of classifying farmers according to demographic or structural variables as has been undertaken by extension researchers in the past (e.g. adopter *v.* non-adopter; innovator *v.* laggard; big *v.* small; old *v.* young; valley floor *v.* hillside), it may be more meaningful to group farmers according to subcultural groupings representing a conglomerate of social and structural variables. These can be called styles of farming (Vanclay *et al*. 1998; Howden *et al*. 1998). The concept of styles of farming is an heuristic that allows for an understanding of the range of world views about how to farm. Appreciating the existence of a range of world views is important. Different farmers have different priorities, different understandings, different values, different ways of working, and different problems. Extension must address the needs of all styles.

Principle 3. Adoption is a socio-cultural process

Rather than extension being a process of communication between science as the only originator of ideas and farmers as passive adopters, extension needs to appreciate that adoption is a social process. The act of adoption is not an unthinking response to information provided by extension, rather it is a deliberate decision by an individual farmer in response to a consideration of a wide range of issues. But adoption is not a singular act of an individual in an isolated context either. Adoption takes place in a social context, with farmers discussing their ideas with other farmers. Much adoption occurs when the idea or practice to be adopted has become part of the normative concept of 'good farm management' (Phillips and Gray 1995; Vanclay and Lawrence 1995).

Principle 4. Profit is not the main driving force of farmers

Contrary to the expectation of many economists, extensionists and agricultural scientists, maximising profit is not the most important thing in farmers' lives (Vanclay 1992*a*). Farmers seek to make a reasonable income for a reasonable amount of work taking a reasonable amount of risk, with each farmer defining what is reasonable for themselves. The additional values and virtues of being a farmer, that is the lifestyle factors, compensate farmers for those times when income may be less than what may be achieved by other endeavours. Appeal to economic incentives alone is not sufficient to bring about change.

Principle 5. It is hard to be green when you are in the red

Although profit is not the main driving force, and the promotion of adoption of new technology requires more than just an economic dimension, it is true that 'it is hard to be green when you are in the red'. Sustainability requires an economic dimension as well as a physical dimension.

Principle 6. 'Doing the right thing' is a strong motivational factor

Farmers do what they consider to be the 'right thing'; they conform to a notion of 'good farm management'. This notion is a complex entity and includes ideas about farming practice and environmental management or stewardship. But it is difficult to always know what good farm management entails. Social research with farmers shows that different farmers have varying notions of good farm management. Good farm management is a social concept and farmers determine what constitutes good farm management through interaction with other farmers, with extension officers (public and private), through reading farming literature and through exposure to other media. Good farm management is not a singular absolute. Rather it is a dynamic concept that takes into account an individual farmer's unique situation, their land, soils, debt situation and goals. Farmers' desire to implement good farm management is responsible for much adoption of otherwise economic environmental management.

Principle 7. Farmers don't distinguish environmental issues from other farm management issues

The notion of doing the right thing, of good farm management, is a composite entity. It includes production issues, environmental issues, and also social issues about being a farmer. Although many extension agencies are, or have been, differentiated into production issues or conservation issues, this is a meaningless differentiation for farmers. There is only one farm. Farming practices have both production and environmental outcomes. Extension advice must be integrated.

Principle 8. There is a strong desire to hand the farm on to one's children

Most farmers want to pass the farm on to their children in a better condition than they themselves received it. This motivation exceeds any rational economic decision about the level of care to invest in improving the farm because it makes any investment of labour, effort, money worthwhile. A major problem exists when farmers believe that their children will not return to the farm because the motivation for investment in improvement is diminished. It is difficult to know precisely when or if children will return to the farm because: (i) sometimes children who have professional jobs in the city and have said all their adult lives that they will never return to the farm, actually will do so when the ageing parents pass away, or announce that the farm is to be sold; (ii) at other times, even when children make it clear that they are not

interested and it may be highly unlikely that they will return to the farm, the parents may still harbour a secret belief that the children will return.

Parents' desires to have children remain on, or at least return to, the farm are powerful expectations that can cause strong feelings of obligation in farming families. This can be especially so when the farm may have been in the family for generations. These feelings of commitment and obligation mean that there may be very strong feelings to keep the farm, against all economic reason. To give up the farm, or worse still the loss of a farm, are often perceived to be signs of personal failure. These feelings of expectation and obligation can cause a range of problems in successional transfer, especially since many farms cannot support 2 families, at least not at the level of some people's disposable income expectation. It has been suggested that succession issues are responsible for much rural suicide. [This point is frequently made in group discussions on the topic although there is no evidence to confirm or deny this point. One example is the Proceedings of the 1999 Property Management Planning Forum (see http://www.soil-water.org.au/pmp/proceedings/pmpgeneration.htm). Qualitative research with farmers done by Vanclay over many years and by Howden (2001) would support this view]. Succession planning is probably inadequately undertaken by most farming families and needs to be the focus of more research and increased attention by agricultural agencies and institutions.

Principle 9. Sustainability means staying on the farm

Extension and NRM agencies want to promote sustainability in agriculture, but they tend to regard this more in terms of biophysical issues (the environment), and sometimes in terms of economic issues. For farmers, the social significance of farming means that the social dimension of sustainability is central; sustainability is meaningless unless it involves the ability to stay on the farm. For farmers therefore, sustainability means something along the lines of 'we as a family, on our farm, in the future'. The physical environmental dimension of sustainability is important, but a continued ability to make a living is more important. Looking after the land, or stewardship, was always part of the notion of good farm management, and so for farmers, sustainability is not a new concept. Only the physical expression of the management practices that sustainability invokes has changed and many of them are contested.

Principle 10. Women are an integral part of the farm

A farm is rarely the embodiment of a singular individual male farmer. The word 'farmer' is a convenience that has an established romanticised meaning that belies the reality of farm management. Farms are often complex partnerships involving many people in financial affairs and in the running of the farm and farm household. Power imbalances and the gender-blindness, if not sexism, that afflicts extension and agricultural science means that the role of women is understated if not unrecognised. In many cases, women have played a major role in farm management. This role has been increasing, and will increase further in the future. Even in individual situations where there has been a strong division of labour, the role of women in the private sphere in the household has been essential to the survival of the farm. Extension needs to acknowledge the role of women on the farm and needs to consider how the needs of women can be met.

The changing structure of agriculture, especially with greater demand for off-farm income to support the farm and an increasing diversity of on-farm activities, means that the role of women is changing, creating new opportunities and also new problems. We need to be aware of these new issues and ensure that they too are addressed. Women are an integral part of the farm, and an important stakeholder for agriculture.

Principle 11. Stage in the lifecycle of a farming family and family composition are significant factors

The stage in the lifecycle of a farm family affects their need for household and disposable income, and this potentially affects finance available for other purposes. But stage in the lifecycle also affects commitment to the future, with young families being more committed to a future on the farm than either families later in the lifecycle, or young single farmers. Stage in the lifecycle is therefore a complicated variable, but it demonstrates that there are many factors that are involved in decisions about adopting new management practices or new crops, and that adoption is not a simple process of communication.

Principle 12. Non-adoption is not the cause of land degradation, rather practices actively promoted by extension in the past have significantly contributed to degradation

Many extension staff believe that non-adoption of the practices they promote is the main barrier to sustainable agriculture, consequently expressing concern about those farmers who do not adopt tree planting and altered management systems. However, it is adoption of many practices that were promoted in the past, for example tree-clearing which leads to salinisation, and excessive use of 'sub and super' (subterranean clover and superphosphate) responsible for acidity, that are largely responsible for environmental problems today.

Principle 13. Marginal farmers are not marginal because of their management ability but rather because of their structural location

The concept of 'the structure of agriculture' incorporates a number of elements. These include both micro-level features such as the size of farms, the activities they undertake, and how much income farmers make, and macro-level features such as the global integration of

agricultural production, processing and retailing networks. Current structures did not develop by chance, but through the interplay of history, government policy, and international patterns of trade amongst other things. Changing world events and the global economy, and more particularly various Australian governments' responses to these changing world events have had enormous impacts on the structure of agriculture, especially at the farm level. This structure has been socially, politically and culturally constructed through settlement patterns, subsidisation and regulation. The size of farms has been influenced by both government regulation and the amount of land required to make a living. This in turn has been affected by the cost of living in rural areas, which has itself been affected by the extent of subsidisation of rural life through both public ownership of important utilities and services, and regulation of private services to ensure that rural residents got a fair deal. The transition to economic rationalist policy in the 1980s, and the ensuing privatisation and corporatisation of government and semi-government entities, as well as deregulation of airlines, banking, telecommunications, and the removal of the agricultural monopoly marketing boards, has had significant effects on rural life (Vanclay and Lawrence 1995). Considerable structural adjustment has occurred, with increasing minimum viable farm size, a commensurate reduction in the number of farms, and a change in the nature of on-farm work, and the need for off-farm income.

Farmers who are now regarded as marginal were in the past regarded as having a viable land holding. Soldier settlement schemes allocated much smaller parcels of land to returning soldiers than would be regarded as viable today. In the current market situation, farmers with small holdings and who are engaged in the production of traditional commodities cannot be earning an income commensurate with most people's income expectations. While many of them continue to survive by having a reduced need for income, it must be remembered that they are not marginal because of any personal failure or because a lack of management skills; they are marginal because they were structured to be marginal.

Principle 14. Farmers' attitudes are not the problem

It is often thought that improved farm management requires an extension and education programme to change farmers' attitudes. But farmers' attitudes are not antagonistic to the environment (Vanclay 1992*a*; Vanclay and Lawrence 1995). Farmers do not believe that they are 'raping the earth' while driving their tractors. Surveys have shown that they have positive attitudes about environmental management generally. However, they may have different views about what environmental management means, about how to implement it, and they have concerns about whether the agricultural management practices being promoted as sustainable are, in fact, sustainable or profitable.

To some extent, this is intuitively obvious. It is not likely that farmers would have environmentally hostile views. The case of land clearing, for example, can be understood from the perspective of many farmers as being 'land improvement' and may even have been required as a condition of the lease. Even if other groups in society (e.g. conservationists, extension staff or agricultural scientists) regard some farming activities as causing degradation of the environment, the understanding of the farmer is different. Thus, the problem is not one of farmers having the wrong attitude, but one of a conflict of views about the right way to manage the farm, and about what constitutes 'good farm management'.

Principle 15. Farmers construct their own knowledge

It is a mistake to believe that only 'science' (as a social institution) can create knowledge that is transferred to the public via extension. All individuals and groups create knowledge about their own experiences of the world. Thus, information that is transmitted via extension is evaluated against other information, knowledge and beliefs held by each individual. Nothing is accepted without evaluation. As the community is becoming more empowered and more sceptical, 'authoritative' information is being rejected. Science does not automatically have credibility and legitimacy.

Farmers create their own knowledge through experimentation and trial, and through their own theorising. The knowledge of science, that knowledge created by scientists, is used by farmers when it is consistent with their own understanding. Even then it is adapted to fit their own world view, and so 'adoption', itself, represents a form of scientific inquiry ('science' as a methodology) by farmers. The knowledge of science is rejected when it is inconsistent with the world view of farmers. Thus, farmers are their own scientists, theorising, hypothesising and experimenting to determine what works.

Sometimes the knowledge farmers create through this process is especially adapted to peculiar local conditions. The harnessing of this local knowledge has sometimes substantially improved the applicability of scientific knowledge. Farmers also develop considerable knowledge about their own farm. They know the local history and local conditions and they use that information in their decision making and management. Within the viticulture industry, for example, it was found that while many agronomic management systems required careful examination of crops for pests and diseases, and extension agencies promoted specific 'scouting' strategies, the precision expected in the course of such scouting was rarely undertaken by farmers. Instead of thorough examination of the whole crop, many farmers used their knowledge of local 'hot-spots', locations on the farm where pest and disease outbreaks were likely to occur first, to minimise their scouting effort (Glyde and Vanclay 1996).

While it is desirable to accept that farmers have (local) knowledge, it is important not to romanticise or overstate the applicability of the knowledge that they do have. Local knowledge is unlikely to provide immediate answers to new problems. Of course, farmers do experiment, and they may develop their own solutions to new problems, and this may help science and other farmers to overcome these problems. But farmers could develop partial solutions that treat the symptom but not the cause, and which could exacerbate the problem over time.

Principle 16. Effective extension requires more than the transfer of technology, it requires an understanding of the world views of farmers

Extension has been predicated on the notion that knowledge transfer was uni-directional, that science was the only originator of new ideas, and that farmers were passive and non-evaluative receivers of new technology. It also held that all new ideas, if successfully extended, would be adopted. Non-adoption could only mean that information transfer had not taken place (not enough media attention) or there was a barrier to adoption; some reason why farmers could not adopt the new technology, such as a lack of money. This argument is somewhat absurd. Surely, if it really did make sense for a farmer to adopt a new technology, and a commitment to that innovation existed (i.e. a thorough belief that the benefits outweighed the costs as broadly defined), a way would be found to adopt. Where non-adoption occurs, obviously a real commitment to the innovation does not exist and non-adoption is a sensible strategy. There are lots of reasons why farmers may not have a real commitment to new technologies, and thus, non-adoption is rational from the perspective of the farmer. Extension needs to be relevant to the needs of farmers, and needs to put their needs ahead of institutional priorities if it is to be successful.

Principle 17. Farmers have legitimate reasons for non-adoption

The reasons given by farmers for not adopting new techniques can be categorised into ~12 legitimate reasons for non-adoption (developed further from Vanclay 1992*b*):

(i) Too complex. In general terms, the more complex the innovation, the greater the resistance to adoption. Complexity makes the innovation more difficult to understand, and generally requires greater management skills. This increases the risk associated with the innovation. Many environmental management practices are complex and require a detailed understanding of physical processes. In some cases, farmers know what is being stated and what is being promoted to address the problem. They simply don't believe or agree with the scientific explanation. Farmers are acting quite rationally by preferring to adopt less complex innovations over more complex ones and by not adopting complex practices at all;

(ii) Not easily divisible into manageable parts. Divisibility allows for partial adoption. Farmers can adopt that part of an innovation that they like or that is consistent with other farming objectives. Obviously, therefore, the more divisible into component parts an innovation is, the more likely it is to be adopted. Under the traditional model of adoption of commercial innovations, partial adoption is thought to inevitably lead to complete adoption. Partial adoption is viewed as a form of trial adoption. Where innovations are not divisible, they are not likely to be adopted, especially if they have other detracting attributes. In this case, farmers must be totally committed to the new innovation before adoption. Such a commitment is unlikely for a range of reasons, and consequently farmers are acting rationally when they do not adopt technologies that are not divisible;

(iii) Not compatible with farm and personal objectives. Farmers are more likely to adopt innovations that are compatible with other farm and personal objectives. Where innovations are complex and indivisible, they are also likely to represent major changes in the management of the farm and, therefore, not be compatible with other operations on the farm. Farmers' personal needs for the use of capital and income, such as the education of children, expenditure on household goods, as well as farm requirements such as the purchase of new machinery, may mean that capital expenditure is not consistent with farm and personal goals at that point in time. The desire to maintain flexibility because of uncertainty in the market place means that innovations that are not consistent with this goal are also likely to be resisted. Because of the fundamental changes to agricultural practices associated with most new environmental strategies, most environmental innovations are not compatible with current farm management practices. Non-adoption under these circumstances is rational from the farmer's point of view;

(iv) Not flexible enough. Many new management practices reduce farmers' flexibility. Farmers like flexibility because it means that they can change commodities in response to market and climatic conditions. Perennial pastures lock farmers into grazing. Zero-tillage systems, with chemical control of weeds, restrict the range of crops that can be grown and the rotations of those crops. Farmers are quite likely to resist the adoption of new technologies that restrict their flexibility. With fluctuating market prices, farmers are acting rationally by wanting to maintain flexibility;

(v) Not profitable. Not all management practices that are offered to farmers are profitable, at least not in the perception of each farmer. Even where farmers accept that some new management practice might be profitable for some (such as demonstrated on a departmental experiment station) they can find reasons why their conditions are different and why they would be unlikely to achieve the same results. Furthermore, farmers know that it takes a few seasons to iron out all the bugs and achieve maximum benefit, so there may be a few

years of lowered income. Because of the economic situation of many farmers, they simply cannot afford such down-time, and it makes more sense for them to continue with a system from which they are confident that they can get a return, than to invite the uncertainty of change. Some innovations, such as sustainable cropping rotations, do not necessarily return profit in every year, but are alleged to increase profit in gross margin analysis over the whole rotation. Potentially, this requires farmers to forego profit (and absolute income) in some years of a rotation in the promise that profit will be increased in other years. But farmers, or more specially their banks, have requirements of a cash flow in every year. Many environmental innovations rarely provide direct economic benefit to an individual farmer, especially when future discounting techniques are applied (Quiggin 1987), but are of benefit to the wider community. If farmers did base their decision solely on economic criteria, there would be very little adoption of environmental innovations. Fortunately, farmers employ a range of criteria in their decision-making processes, and do what they consider to be the right thing as much as it is practicable. Nevertheless, it is a truism that the more expensive environmental management practices are (in terms of immediate financial and intellectual capital outlay and the labour required, and in terms of the benefit/cost ratio over time), the less likely adoption will be. If farmers were being strictly rational, little adoption of environmental innovations would occur. They ought not be criticised for not adopting when the economic situation does not warrant it. There is a certain irony in that farmers are criticised for not adopting practices that extension believes to be profitable, but they are also criticised for not adopting environmental innovations which are not profitable;

(vi) Capital outlay is too high. In addition to the economics of the innovation in terms of whether or not the innovation will increase profit, it is necessary also to consider the capital required to adopt the new technology. Much innovation requires considerable capital outlay in the form of new machinery, seeds, agrichemicals or earthworks. Often, adoption of new techniques may require the farmer to forego income until the new system is established. In this situation, the farmer must have the resources not only to adopt the new technology, but also to survive the period until the new innovation produces income. In the current period of farm financial crisis, many farmers have negative incomes, and with declining farmland values and equity levels, many farmers have no borrowing power (despite the fact that interest rates are at relatively low levels). In other words, most farmers do not have the capital resources available to them to adopt any new technology that requires a substantial capital outlay. It should be noted that most banks regard farm investment as high risk and charge high risk margins, meaning that farmers may be paying 5–10% more for their farm loans than the average private owner-occupied housing loan. Despite the current low rate of interest, the interest rate for farm borrowings may still be higher than the return on capital invested on the farm. This means that it is economically irrational for farmers to borrow (or even to be a farmer at all). In addition to the lack of capital to outlay, the farm financial crisis means that most farmers are unwilling to take any risk because failure might have disastrous consequences. Risk taking behaviour is more likely when the farmer can afford the consequences of failure;

(vii) Too much additional learning is required. In addition to the capital costs associated with the adoption of new technology, there are also intellectual costs. Farmers may have to learn new ways of doing things. Many of the new recommended farming strategies require much greater knowledge about cropping systems and about the chemicals that are used in modern agriculture. This classification is similar to 'complexity', but relates to the knowledge base of the individual farmer rather than to an objective measure of complexity. This is not a patronising view of farmers because farmers would not be unique in attempting to minimise the amount of knowledge needed in order to conduct their operations;

(viii) Risk and uncertainty is too great. Risk is usually associated with commercial innovations because it refers to farmers' concerns that the capital and other resources invested in adopting the technology will not result in any benefits. However, the concept also refers to environmental innovations, in that farmers need to be sure that the conservation technology or initiative will actually provide the anticipated environmental benefits and outcomes. Farmers could expend resources adopting a new technology, buying new machinery, and altering the management of the farm in order to farm more sustainably, only to find that the new technology fails to solve the environmental problems it was intended to solve. In this sense, the risk is always greater for environmental innovations than for commercial innovation. With commercial innovations the main risk is capital outlay and perhaps the yield of one season. With environmental innovations the risk includes the capital resources expended (often considerable when production strategies are required to be altered) and the production for that season. These are weighed against the production for future seasons if the environmental degradation is not stopped. While farmers do not necessarily make conscious and sophisticated analyses of the degrees of risk in adopting technology (the information required to do this is seldom available), they are aware of the implications of particular choices. The economic situation faced by farmers tends to promote an aversion towards risk and uncertainty;

(ix) There is conflicting information. No new technology, especially that designed for conservation purposes, is free of debate about its applicability and effectiveness. Farmers receive information from numerous sources and those sources often contradict each other. In a situation where there is already some uncertainty, conflicting information further

suggests that non-adoption is an appropriate management strategy;

(x) Don't see that there is a problem (lack of appreciation of the problem). Considerable research has established that farmers are likely to adopt environmental management techniques when, among other things, they consider themselves to be personally at risk from environmental degradation (see for example Vanclay 1992*a*, Rickson *et al*. 1987). However, much of the extension literature, conservation literature, and general media reports depict land degradation in its most dramatic forms: deep erosion gullies, salt encrusted pans, or exposed tree roots resulting from wind erosion. The presentation of land degradation in this dramatic form is counter-productive (Vanclay 1992*a*). While farmers are made aware of the issue, they do not see the same degree of degradation occurring on their own farm and consequently believe they do not have a problem. They will claim this even when it is known that the problem may be serious in their own locality. Where farmers do experience land degradation in such a severe form, they may feel powerless to address the problem, and adopt a fatalistic attitude rather than undertake any reclamation action or fundamentally change their management practices;

(xi) Lacking the physical infrastructure. Agricultural commodity production requires certain physical infrastructure, such as handling facilities to enable the crop to be marketed. Historically, that infrastructure was provided by government in the form of commodity marketing boards and other organisations, which together provided a network of silos and railways, as well as extension services to provide advice on issues. The existence of this infrastructure meant that it was largely impossible for farmers to grow anything that was not compatible with that infrastructure. Current concern by government to increase production of higher-value crops, and a perception about the reluctance of farmers to grow new crops, should be tempered by regard to consideration of the history of agricultural production.

(xii) Lacking the social infrastructure. In the same way that a physical infrastructure exists as a mechanism to encourage production of particular crops, and inhibit others, a social infrastructure also exists. The social infrastructure refers to the social networks of farmers, which provide a knowledge bank for farmers to utilise. The accumulated knowledge of other farmers is usually regarded as a more important source of information than extension services. Except for a few maverick farmers, no individual farmer wants to be the only one doing a particular activity because they would have no social support to discuss their problems.

Principle 18. Top-down extension is inappropriate

Vanclay and Lawrence (1995) identified 5 major criticisms of traditional top-down extension. While contemporary extension agencies are moving away from traditional extension practices, the ideology that supported top-down extension persists in subtle forms. It is worth reiterating those criticisms of traditional extension to help ensure that those problems are not manifested in modern extension.

First, extension has uncritically accepted the products of agro-industrial agriscience and agribusiness, and has seen as its task to simply promote those products. Second, this uncritical acceptance of these products, and their adoption by farmers, has led to considerable social and ecological impacts. Third, the adoption-diffusion model is premised on commercial innovation in which it is perceived that farmers would benefit. Thus, it does not cater for environmental innovations, which may not be of benefit to individual farmers. Fourth, farmers' local knowledge has been marginalised, trivialised, subordinated and ignored. Finally, extension utilised a psychological model of individual decision making and ignored the social, political, cultural and historical context of agriculture and adoption behaviour.

Principle 19. The 80–20 rule is a self-serving delusion

There is a story in extension circles that 20% of farmers produce 80% of the agricultural wealth. This view is then used to legitimate the provision of extension services only to the top 20%. Sometimes that view is further legitimated by arguing that these 20% of farmers provide role models for the remaining farmers and that the ideas extended to the top farmers will trickle-down or diffuse throughout the farming population. In this way, the work of extension officers is undertaken even while they sleep! Even when the trickle-down concept was not applied, the view had support because it was felt that the bottom farmers were recalcitrant laggards who would not change, and who were not part of the future of Australian agriculture.

This view is a self-serving fantasy that is socially inequitable and dangerous from an environmental perspective. It is inequitable because it has legitimised extension to focus on the needs of the top farmers, ignoring the needs of other farmers which may well be different. Thinking about the concept of styles of farmers, it is not necessarily true that the 80% would not adopt new ideas; it may be just that the practices being promoted, and the manner in which they were promoted only fitted with the world views of some of the farming styles. Had there been attention given specifically to the needs of a greater range of farmers, perhaps the rate of adoption would have been greater.

The story is damaging to the environment in that natural resource management issues affect all of the Australian landscape. The severity of issues such as salinity mean that we cannot be complacent with appealing to change in the practices in a small percentage of farmers. While the potential salinity threat is not evenly distributed over the landscape, the farmers likely to be affected by salinity are not

necessarily in the top 20%. Environmental issues mean that we need to be concerned about all farmers.

Principle 20. Science and extension do not have automatic legitimacy and credibility

Many decades ago, Australian farmers placed a great degree of trust in the agricultural research and extension system; at least this was widely believed and accepted. Extension officers felt important delivering useful information to an eager and receptive farming population. Those days have gone, if they were ever true. Today, farmers are sceptical and dubious about the stated claims of practices being promoted. The high credibility the research institutions had has been lost, and farmers no longer immediately accept what is being promoted as being factual.

Principle 21. Representation is not participation

As a general rule, participation is a good thing. The involvement of farmers on boards and committees is desirable. However, there is a danger that representation is simply tokenistic. The main criticism of representation is that it doesn't necessarily mean participation, certainly not of the full range of farming styles. A major concern is that the farmer representatives are seldom representative of all farmers. Often they are chosen, not because they are farmers *per se*, but because they are farmers who have considerable experience appropriate to the business activities of the Board or Committee on which they seek to serve. Because of their corporate experience, their world view and life circumstances are very different from most other farmers. Thus, only certain styles of farming are represented. Therefore, farmer representatives are unlikely to be able to speak on behalf of styles other than their own, except on matters that are common to all (or at least most) farmers.

Farmer representatives are seldom in the majority on any committee, and thus can easily be marginalised. This marginalisation is even greater for any farmer representatives who are not used to the corporate discourse. Farming, although requiring considerable decision-making activity, is not an area calling for abstract conceptualisation and articulation in the same way as expected in the corporate discourse. The corporate discourse itself acts to subordinate farmers. The bind is that those farmers who become comfortable with the corporate discourse become 'bureaucratised', accepting the hegemonic corporate agenda and thus failing to represent farmers at all. Enabling participation is more difficult than getting a few representatives on a committee.

Principle 22. Promotion of awareness through the use of dramatic images is counterproductive

Vanclay (1992*a*) has argued that because of the influence of dramatic images in the general media and in extension literature, farmers' concern about degradation has become inflated (that is they have increased awareness), but they do not perceive themselves to be at risk because the land degradation they experience is nowhere near as severe as the images being depicted.

Vanclay and Cary (1989) identified that one of the issues in relation to adoption of salinity control methods was the lack of knowledge by farmers of the early warning signs; the salt indicator species. However, the problem with many early warning signs is that they are not unique to a single issue, and can easily be attributed to other reasons. For example, a poor germination rate, reduced prolificness, or reduced species prevalence could be attributed to a lack of moisture, too much rain, hot weather, cold weather, poor seed, pests, diseases, etc. Sometimes, tell-tale signs become so common that they are simply disregarded, for example, few farmers regard muddy dams or cloudy creek water as evidence of soil erosion. It is desirable, then, that farmers develop an understanding of the land, and that they consider the environmental processes, especially land degradation processes, that may contribute to any feature of the landscape they observe. This has come to be known as 'land literacy'. People need to be able to read the land for what it is telling us about its health and about the health of our society and our production systems.

Principle 23. Put degradation into perspective

There are many technical definitions of 'land degradation'. However, what extension officers and scientists regard as degradation is not necessarily perceived as degradation by all farmers. Generally, this discord is perceived by extension as the failure of farmers to develop sufficient 'awareness' of the issue. But strictly speaking, degradation is a value judgement made about what is an unacceptable rate of change. Land degradation occurs because of naturally occurring geomorphological processes. Our fertile farming lands are the result of the same processes that are now regarded as degradation, only having occurred at a slower rate and over a much longer period of time. Farm management practices accelerate the rates of these natural occurring processes, with some practices causing them to occur at a higher rate, and other practices causing the rate to be slower. Since these processes are naturally occurring, they occur irrespective of the farming practices used, and even if the decision is not to farm. Thus, the understanding of these processes as induced degradation, rather than as a natural process, represents a social understanding about the acceptability of the rate of the process. What rate of these processes is acceptable?

Nutrient decline and acidification (at rates believed to be a problem) are virtually inevitable outcomes of all farming activities because of the harvesting of crops and consequent removal of plant material. Structural decline and erosion are possibly also inevitable because of machinery use. Nutrient decline and acidification potentially can be corrected artificially through the application of fertilisers and lime,

respectively. The socio-economic issue here is that the cost of rectification may exceed either the increased yield to be gained from rectification, or the cost of replacing the land with new land (buying out the neighbour). Farmers are aware of this. Thus, awareness of land degradation occurring on the farm does not mean that it is economically rational for farmers to take ameliorative action.

Economists (e.g. Quiggin 1987) have discovered that most ameliorative actions to prevent land degradation are not economically rational, especially when future discounting is applied and the discount rate (interest rate) is high. Fortunately, neither farmers (nor anyone) are economically rational beings. While they cannot be expected to do things that are manifestly not economical, the argument put repeatedly here is that economic decisions do not alone determine farming practice.

Further, it could be considered that if degradation is the loss of productive farm land, then the greatest form of degradation is not salinity or acidity, but the conversion of farm land to non-farm use, usually for urban expansion or rural residential development. The impacts of this for Australian farmers are not only in terms of lost land (which affects Australia as a nation, but doesn't affect farmers directly), but also in terms of raising the price of land in those areas subject to expansion beyond the reach of farming so that smaller farmers cannot expand to deal with cost-prices squeezes and economies of scale. From a sustainable agriculture point of view, we should be concerned about protecting (zoning) our productive farmlands, to protect them from conversion to non-farm use. Whatever attractions rural residential (urban fringe) blocks may have for those people who desire them, they are undesirable from a sustainability point of view. The issue of rural residential blocks causes many other disputes between rural residents and farmers, particularly over issues like pest and weed control, chemical use, odours and noise. This is a complicated issue, and there is potential for creative solutions as well, although they do not appear to be applied in many cases. However, it does give a different perspective on the question of what is 'land degradation', and demonstrates the importance of a social analysis in answering that question.

In terms of other environmental issues, notably water use, farmers are not the only water users. Wasted water in industry and in domestic applications also reduces the water available for environmental flows. Farmers feel that urban users should make a contribution as well. Forestry is also a high consumer of water by intercepting rainwater from entering river systems.

Principle 24. The best method of extension is multiple methods

One of the more frequent questions raised in extension discourse is what is the best method of extension. The expected answer is usually a singular and simplistic response: facts sheets or farm visits or field days etc. When the diversity of farmers is appreciated, and the socio-cultural basis of farming understood, there can be only one answer; there is no singular best method of extension, multiple methods of extension are required to deliver the message to the diverse range of farmers, and to reinforce the message in different ways.

Principle 25. Group extension is not a panacea

With reduced public expenditures and a concern about private benefits, state governments are having to reduce publicly funded extension services. However, there is still a recognised need for dissemination of an extension message, especially in relation to NRM issues. Group extension has been seen to be an efficient way of communicating that message. Group extension does have many virtues, but it is not a solution to every issue. In the end, each farm is different and farmers use awareness of the differences of their farm as a way of justifying why a certain practice may not be appropriate to them. Individual, one-to-one extension is needed to assist in on-farm issues.

Extension is also a process where the credibility of the person giving the advice is an important factor in the weighting that farmers assign to that advice. Credibility is developed over time through the provision of credible, practical, useful answers that assist farmers in the day-to-day operations. Group facilitators who never provide on-farm advice rarely develop credibility and their ideas are easily dismissed.

Thus, a strong argument can be mounted that group extension requires one-to-one extension, and that the credibility of extension officers in a group setting is enhanced by their one-to-one extension experience.

Principle 26. Extension is likely to have only a small impact

This social understanding of farming and the adoption process creates the realisation that effecting extensive change (large changes and changes to a large percentage of the farming population) is unlikely. This does not mean that extension is ineffective or unsuccessful. It just means that there needs to be realistic expectations about the degree of the change that will occur. When realistic expectations are held, extension has been successful, rather than having been a failure.

Principle 27. Farmers need to feel valued

In terms of natural resource management, Australia is asking its farmers to make a significant personal investment for what is largely a public benefit. Because of notions of stewardship and the concept of good farm management, most Australian farmers are prepared to make their contribution. But they need to know that this contribution is appreciated and valued by the broader community.

Although tax relief schemes do not benefit most farmers (as they have low taxable incomes), and many grant schemes don't necessarily achieve their intended objectives or have implementation and administration difficulties, some form a co-funding is important because it demonstrates to the farming community that the urban community cares, and is prepared to pay for the environmental benefits they ask for. Evaluations of these schemes need to consider the effect of farmer commitment to natural resource management in general, and should not be evaluated strictly against narrow criteria.

Conclusion

Farming is a social and cultural activity. Farm management practices are physical manifestations of cultural expression which are loaded with social meanings and significance, they are not solely technical. Farmers want practical advice, but that advice needs to be based on a social understanding. A key aspect of that social understanding is that diversity in agriculture should be conceived of in social, rather than merely in physical or structural terms. Understanding farming from a social perspective will greatly assist in the promotion of sustainable agriculture.

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References

Glyde S, Vanclay F (1996) Farming styles and technology transfer. In 'Social change in rural Australia'. (Eds G Lawrence, K Lyons, S Momtaz) pp. 38–54. (Rural Social and Economic Research Centre, Central Queensland University: Rockhampton)

Howden P (2001) Working with the grain: farming styles in broadacre cropping. PhD Thesis, Centre for Rural Social Research, Charles Sturt University, Wagga Wagga, Australia.

Howden P, Vanclay F (2000) Mythologisation of farming styles in Australian broadacre cropping. *Rural Sociology* **65**, 295–310.

Howden P, Vanclay F, Lemerle D, Kent J (1998) Working with the grain: farming styles amongst Australian broadacre croppers. *Rural Society* **8**, 109–125.

Lockie S (1996) Sociocultural dynamics and the development of the landcare movement in Australia. PhD Thesis, Centre for Rural Social Research, Charles Sturt University, Wagga Wagga, Australia.

Lockie S, Mead A, Vanclay F, Butler B (1995) Factors encouraging the adoption of more sustainable crop rotations in south east Australia: profit, sustainability, risk, and stability. *Journal of Sustainable Agriculture* **6**, 61–79.

Phillips E, Gray I (1995) Farming practice as temporally and spatially situated intersections of biography, culture and social structure. *The Australian Geographer* **26**, 127–132.

Quiggin J (1987) Land degradation: behavioural causes. In 'Land degradation: problems and policies'. (Eds A Chisholm, R Dumsday) pp. 203–212. (Cambridge University Press: Cambridge)

Rickson R, Saffigna P, Vanclay F, McTainsh G (1987) Social bases of farmers' responses to land degradation. In 'Land degradation: problems and policies'. (Eds A Chisholm, R Dumsday) pp. 187–200. (Cambridge University Press: Sydney)

The Australian Oxford Paperback Dictionary (1989) (Oxford University Press: Melbourne)

Vanclay F (1986) Socio-economic correlates of adoption of soil conservation technology. MSocSc Thesis, Department of Anthropology and Sociology, University of Queensland, St Lucia, Australia.

Vanclay F (1991*a*) 'Attitudes of Australian farmers: no barrier to adoption of soil conservation technology.' Soil Conservation Service of NSW, Annual Research Report 1990–91, Wellington.

Vanclay F (1991*b*) Land degradation: a social rather than technical issue. In 'Conference summary papers, third national conference of the Environment Institute of Australia, 23–25 October 1991'. (Environment Institute of Australia : Canberra, Australia)

Vanclay F (1992*a*) The social context of farmers' adoption of environmentally sound farming practices. In 'Agriculture, environment and society'. (Eds G Lawrence, F Vanclay, B Furze) pp. 94–121 (Macmillan: Melbourne).

Vanclay F (1992*b*) The barriers to adoption often have a rational basis. In 'Proceedings of the 7th International Soil Conservation Organisation Conference, Sydney, September 1992, People protecting their land, Vol. 2'. (Eds PG Haskins, BM Murphy) pp. 452–458. (International Soil Conservation Organisation: Sydney)

Vanclay F (1993) 'Salt awareness of farmers in Junee and Cootamundra Shires.' (Centre for Rural Social Research, Charles Sturt University: Wagga Wagga, Australia)

Vanclay F (1994) The sociology of the Australian agricultural environment. PhD Thesis, Wageningen Agricultural University, Wageningen, The Netherlands.

Vanclay F (1997) The social basis of environmental management in agriculture. In 'Critical landcare'. (Eds S Lockie, F Vanclay) pp. 9–27. (Centre for Rural Social Research, Charles Sturt University: Wagga Wagga, Australia)

Vanclay F (1998) Inclusion of social data in the National Land and Water Resources Audit. *Rural Society* **8**, 39–48.

Vanclay F (1999) A sociological look at natural resource management: environmental management in Australian agriculture. In 'The challenge of rehabilitating Australia's streams: proceedings of the 2nd Australian stream management conference (Adelaide, February 1999) Vol 2'. (Eds I Rutherfurd, R Bartley) pp. 649–653. (CRC for Catchment Hydrology: Melbourne)

Vanclay F, Cary J (1989) 'Farmer perceptions of dryland soil salinity.' (School of Agriculture and Forestry, University of Melbourne: Melbourne, Australia)

Vanclay F, Glyde S (1994) 'Land degradation and land management in Central NSW.' (Centre for Rural Social Research, Charles Sturt University: Wagga Wagga, Australia)

Vanclay F, Hely A (1997) 'Land degradation and land management in Central NSW: changes in farmers' perceptions, knowledge and practices.' (Centre for Rural Social Research, Charles Sturt University: Wagga Wagga, Australia)

Vanclay F, Lawrence G (1995) 'The environmental imperative: ecosocial concerns for Australian agriculture.' (Central Queensland University Press: Rockhampton, Australia)

Vanclay F, Lockie S (1993) 'Barriers to the adoption of sustainable crop rotation.' (Centre for Rural Social Research, Charles Sturt University: Wagga Wagga, Australia)

Vanclay F, Mesiti L, Howden P (1998) Styles of farming and farming subcultures: appropriate concepts for Australian rural sociology? *Rural Society* **8**, 85–107.

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