18. Recommended Procedure for Future MODSS in Farm Forestry

Ian Jeffreys, Phil Norman and Paul Lawrence

This chapter proposes a procedure for future MODSS in farm forestry. It assumes similar limitations as those which applied in the South-east Queensland and the Hodgson Creek study. The most critical constraint was that contact with the stakeholders, especially landholders, was limited to a half-day workshop. A recommended procedure is described, which aims to support and facilitate the decision-making process and maximise community input to support implementation.

18.1 The Recommended MODSS Procedure

The MODSS process is defined as an iterative construction of a multi-objective decision-support system (MODSS). This process will use a multi-criteria analysis (MCA) tool to evaluate an effects table defined by the stakeholders and technical experts. The first stage involves developing a simple analysis in a workshop environment with local stakeholders and some experts. This initial analysis developed by the stakeholders can then be expanded and re-evaluated by technical experts, with feedback from stakeholders when possible. It is expected that the analysis will undergo a number of iterations before the final outcomes are produced, reported and presented to the wider community.

These recommendations for the MODSS process have been developed drawing on the experience of applying a MODSS to assess farm forestry in South-east Queensland and the Hodgson Creek catchment. This process has also been informed by the literature review presented in Chapter 4 and the processes discussed and developed in Chapters 13 and 14. The proposed procedure contains 10 critical steps to achieve this goal. Each of these steps is discussed in the following section.

1. Identify stakeholders

Stakeholders are those members of the community that will be affected by the outcome either negatively or positively and also include those persons who can affect the outcome. The analyst should be aware that the poor and marginalised are often stakeholders directly affected by an activity. The process of identifying stakeholders should allow persons to self-identify as stakeholders. An initial list of stakeholders in farm forestry would include landholders, Landcare and forestry industry officers, as well as local and state government officers. Other stakeholders may include members of the local indigenous community, local clerics and teachers, all members of landholder families, and representatives of local environment advocacy groups. It is vital that when a broader section of the stakeholders are present, all members have input in to the process. As part of the process, each stakeholder should articulate their position on the issue and their interest in the outcome.

2. Conduct stakeholder workshop

A stakeholder workshop should be convened, which includes a small number of farm forestry experts the role of whom is restricted to advising the meeting on technical issues as they arise. An independent, professional facilitator should conduct the workshop. Their role should be to ensure all opinions are allowed to be expressed without constraint, and to ensure no single group or the proponents of the issue dominate the workshop. The workshop should comprise landholders, Landcare coordinators, forestry industry representatives, local government staff, state government extension staff, as well as selected farm forestry experts.

3. Commence to develop a MODSS on farm forestry

The following is a guide to the process of developing a simple MODSS for farm forestry. Using a workshop setting, the suggested sequence of activities should be:

a. The facilitator introduces the MODSS process and explains the proposed plan for developing the MODSS.

b. The purpose of MCA tools is introduced using a simple example that is both illustrative of the basic principles of decision-support as well as appropriate given the experience of the stakeholders. An example about purchasing various types of new and second-hand cars may have widespread recognition.

c. The broad range of issues that affect farm forestry, and ways in which farm forestry can affect their catchment, are introduced. A brainstorming approach should aim to identify as many issues as possible, ranging from impacts, benefits, environmental, economic and social barriers and considerations, impediments, anecdotal experiences, actors, reasons for planting trees and reasons for not planting trees. The facilitator may elect to categorise these issues under broad headings as a means of consolidating the discussions. In a later step, these aggregated issues can be used to develop the decision criteria to evaluate the options. Once this is completed, the facilitator should try to focus on goals and objectives, as well as the desirable outcomes, from an individual landholder perspective and a whole-of-catchment viewpoint. The discussion should focus on the benefits and limitations of farm forestry in the catchment and to landholders. These discussions could include the experience in this catchment and other catchments, but with the intention of developing possible farm forestry options for the catchment.

d. The next activity is to review and refine the feasible farm forestry options in the catchment. Involving experienced farm advisors and government staff would assist this stage of the process. In developing these options, consideration must be given to physical constraints within the catchment (for example, soil type and depth, aspect, rainfall) as well as cultural issues that affect the implementation of farm forestry practices. This discussion may challenge the landholder's ideas and views, and requires careful facilitation and access to objective information and advice.

e. Drawing on the goals and values of the stakeholders, next develop the decision criteria that will be used to evaluate the options. It is important that only a minimal set of criteria is defined, perhaps restricting the list to two or three criteria for each of the major perspectives in natural resource management, namely social, economic and environmental perspectives. Each option will be evaluated against these criteria, and experience has demonstrated that this can prove to be a highly time-consuming process.

f. The relative importance of the criteria should be defined preferably from the landholder perspective. That is, which criteria are of the greater and lesser importance when the landholders are considering farm forestry options? The criteria should then be given an ordinal ranking consistent with the preferences of the landholder.

g. The *effects table* is now defined using the options and criteria as the basis. In evaluating the options, a scoring range of 1 to 3 or 1 to 5 is feasible in these situations. Against each criterion, the best option should be assigned the highest score, and the worst assigned the lowest score. The remaining options should be scored relative to the best and worst options. As the scores are assigned, the analyst can progressively enter the data into the MODSS software package.

h. This initial effects table should then be analysed. The software package *Facilitator* (Lawrence and Shaw, in process) is suited for this type of simple application, although there is often confusion with regards to the clarity of the results. *Facilitator* reports a maximum and minimum possible aggregated score for a given effects table and importance order, and there is often a high degree of overlap between the minimum score of one option and the maximum of another option. This is a result of the aggregation technique used in *Facilitator*. As an alternative, *Definite* (Janssen *et al*. 2001) has greater clarity of results, but use of this package can prove unwieldy in a workshop setting. It may be useful to employ *Facilitator* in the initial stages of a project, especially in workshop situations, and then move to *Definite* in the later stages, because *Definite* has greater analytical functionality.

i. The results should be evaluated in the workshop and feedback on the outcomes immediately provided to the stakeholders. The stakeholders should refect on the completeness of the analysis, and identify missing factors. These should include factors not reflected in the decision criteria or additional options which need to be considered. Any other comments on the analysis should be noted and included in the next iteration of the analysis, if time permits.

j. The options, criteria and importance orders should be re-visited and re-evaluated. It may be useful to conduct further iterations of the analyses to examine different scenarios and importance orders of the criteria. In this way, as many iterations as possible should be completed. Two or three analyses are a desirable target for a half-day meeting. It is vital that the discussions and comments are recorded, because these data will inform the next stages of the process.

The above process is designed to facilitate and promote discussion of the issues, factors and drivers relevant to the study of farm forestry. It can be described as a 'quick and dirty' MODSS. The analysis, while indicative of the possible performance of the options, is secondary to the discussion of the options. It is also desirable that the workshop facilitator encourage the stakeholders to use the MODSS tool so that they can self-investigate other options and practice action-learning principles. This is possible using the *Facilitator* software; however, experience has shown that *Definite* may not be as conducive to workshop use because it requires considerable training and familiarity.

k. The final stage of the workshop is to formulate a consolidated set of criteria developed from previous studies (see Chapter 17, Section 2 for a set of possible criteria). From the MODSS developed in the workshop, criteria should be added where gaps exist, and should be removed where redundancy exists between overlapping criteria. The overall number of criteria should however not significantly change, having regard for 4 to 7 criteria for each environmental, economic and social perspective. Because the number of criteria can increase rapidly, the workshop facilitator must exercise caution and control to manage the number of criteria. In many cases, a large number of criteria adds little information to the analysis but considerably increases the effort required to evaluate the effects matrix.

l. Weights that are applied to the criteria should now be defined. The relative importance of the criteria can be elicited from the stakeholders in accordance with their concerns and preferences. This can take a number of forms. It is suggested that a rank order of importance be used. These rank importance orders are used by the MODSS tool to assign weights to the criteria when aggregating the criteria scores into a combined measure of performance.

4. The proposed list of criteria

For future MODSS for farm forestry, it is recommended that the number of criteria should be limited to approximately 21 in all. This number of criteria balances the desire to include all perspectives and considerations, with the need to create an effects table that can be evaluated in a reasonable timeframe. On the basis of the experience in this study, the following list of criteria are recommended for the evaluation of farm forestry options:

a. Economic group of criteria
   Forestry viability
   Infrastructure costs (community)
   Profit (in transitional or steady state period)
   Cash flow
   Risk profile
   Liquidity of assets

b. Environmental group of criteria
    Soil resource quality
    Water quality and salinity control
    Water quantity
    Cumulative impacts
    Pest habitat
    Displacement of existing native bio-systems
    Air quality (spraying of agricultural chemicals)

c. Social group of criteria
    Aesthetic amenity
    Change management requirements (including reskilling)
    Consistency with local, state and federal government regulations and policies
    Maintaining services
    Community health
    Health effects on family

5. Eliciting criteria importance orders

While eliciting the importance orders of this refined set of criteria from the stakeholders, it is important to focus efforts on the landholding stakeholders. The particular attention placed on the landholder group is because it is likely that the stakeholder meeting will be the only contact the analyst will have with these people, and the landholders will be the group most responsible for implementation of the farm forestry options. The other stakeholder groups can be contacted later in the analysis. It may be useful at this stage to split the stakeholders into two groups, namely (1) landholders and Landcare members, and possibly a farm forestry expert known to the stakeholders, and (2) extension officers, local government officers, state government officers and industry representatives. Each group can then consider the importance orders of the criteria and bring these preferences to the discussions as part of the scenario analysis.

6. Documenting the process

The discussions with stakeholders and experts and analyses developed in the stakeholder workshops should be recorded and preserved for later discussions. Each iteration should be documented, with rationales behind changes to the analysis included, as well as descriptions of the options and criteria and any subsequent changes in definitions. This documentation should be returned to the stakeholders shortly after the workshop and feedback requested.

7. Convene a technical reference group

Identify and convene a technical reference group to review the outcomes from the MODSS conducted by the stakeholder group. This meeting will also consider the options and criteria – in particular the spatial extent and temporal variability of the options.

8. Spatial representations of the options

The likely spatial extent of the options should be developed using a geographical information system (GIS). A GIS can assist in formulating feasible options by superimposing areas of forestry plantings on an image of the catchment or farm location. This work would be undertaken in consultation with the technical reference group

9. Evaluate the options against the criteria

The technical reference group then evaluates the options against all the criteria for the defined timescales. Currently, it is proposed that the evaluation will be the considered opinion of the technical reference group members. Two methods of evaluation may be considered. In the first, the highest score is assigned to the best option and the lowest to the worst, and all other options are assigned the intermediate values. In the second method, the technical reference group identifies a best and worst possible option for each criterion. These would be hypothetical options and would need to be evaluated. The best and worst possible options would then be assigned the highest and lowest scores respectively. The other options again would be assigned intermediate values. It may be advantageous for the technical reference group to score the criteria in their own time prior to the second technical reference group meeting. The analyst can then combine the data and highlight differences of opinion. The analyst should only highlight and not try to resolve differences. In the second technical reference group meeting these differences in scores are highlighted and discussed. Consensus should be sought with regard to all scores – those where there is agreement and those where there is a difference of opinion. Thus an effects table is produced. If time allows, the effects table should be analysed and presented to the technical reference group in the second meeting. However, if time is scarce, the results should be presented to the expert group as soon as possible. Results should be discussed and feedback sought. Options, criteria, scores and importance orders should be re-evaluated and the analysis repeated. This process should be continued until the technical reference group is satisfied that the outcomes of the analysis are consistent and defensible. The analysis should be appraised and the results fed back to all the stakeholders and experts.

10. Report the findings to the stakeholder and technical reference group

Convene a final meeting that is open to all interested parties including stakeholders, the technical reference group, and other government and industry bodies. It might also be beneficial to invite persons from other catchments who may be interested in applying a MODSS approach. At this meeting, the outcomes of the analyses developed in the stakeholder workshops and the final analysis produced by the technical reference group should be presented. Notes and comments on the final results should be incorporated into the analysis. The process and outcomes should be included in the final project report. This would include possible changes for future applications and an implementation and monitoring strategy of the preferred option.

18.2 Discussion

It is difficult to visualise individual farmers sitting at the kitchen table using decision-support software such as *Facilitator* in planning tree planting. Possibly large-scale commercial farms and corporate entities may use such an approach to inform decisions about a range of farm issues. However, individual farmers are generally suspicious of such 'black box' approaches. The processes applied, although relatively simple, are unseen, being hidden in software packages. This has aroused suspicions as to the nature of the analysis, although acceptance of these methods by stakeholders will increase as stakeholders receive greater exposure to them. However, a simple cut-down manual version could be appropriate.

Contemporary extension thought emphasises the need for farmer groups to undertake self-supported decision-making in natural resource and land-use management. It is in these types of forums where MODSS and the software package *Facilitator* are ideal. Facilitator has already demonstrated utility in catchment planning where supported with group facilitation leadership.

Given the increasing push toward multi-dimensional and integrated approaches to natural resources and land-use management and the push for decisions to be moved downward from central administrators towards local landholders, the relevance of MODSS is likely if anything to increase.

There needs to be investment to build rapidly the capacity in catchment groups to make the types of multi-objective decisions that are now being expected of them. MODSS and the *Facilitator* software package may be well suited to this task.

References

Janssen, R., van Herwijnen, M. and Beinat, E. (2001), *DEFINITE (version 2) DEcision support system for a FINITE set of alternatives*, Institute for Environmental Studies, Vrije Universiteit, Amsterdam.

Lawrence, P. A. and Shaw, R.J. (in process), 'A framework for evaluating options for improved irrigation management', in Proceedings MODSS'99 2nd International Conference on Multiple Objective Decision Support Systems for Land, Water and Environmental Management, Brisbane 1-6 July, 1999.