Assessing the impact of Beyond Soilcare project: using a Goal Attainment Scaling technique

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Abstract. Beyond Soilcare is a community driven project that uses adult learning principles to increase landholder understanding and management of the ecosystem by building a long-term commitment to soil health. This paper outlines how the Beyond Soilcare project has moved from counting outputs to an evaluation method called Goal Attainment Scaling, which demonstrates the impact of the project and provides evidence of landholders' understanding of soil related issues and implementation of informed soil management practices. The technique involves the development of an outcome scale to measure progress towards achieving goals. For the Beyond Soilcare project, six key goal areas were developed. For each of these goals a measure was developed to identify changes in expected results at five different levels of achievement. The use of this technique has provided evidence of impact in all six goal areas indicating that the project helped landholders to plan and adopt soil health related activities on their properties.

Keywords: Soilcare, goal attainment scaling, outputs, outcomes

Introduction

Beyond Soilcare is a community driven action learning project which aims to increase landholders' understanding and management of the ecosystem by building a long-term commitment to soil health and an improvement in farm and catchment resilience. The project services the Goulburn Broken Catchment in northern Victoria including dryland and irrigated areas.

The Beyond Soilcare project incorporates adult learning principles. It seeks to build the capacity of groups and individuals to identify their own soil related issues and develop and implement community driven solutions. These solutions are supported by specialist knowledge and technical advice provided by Beyond Soilcare staff and other professionals.

The Beyond Soilcare project targets threats to environmental and resource management on private land posed by issues of soil acidity, fertility, structural decline, carbon, biology, sodicity, erosion and salinity. Working with landholders to identify practical solutions, these issues are addressed using a range of different activities including workshops, training, on farm trials, focus farm discussion groups, one-on-one extension and community forums.

Assessing the impact of a project which incorporates a range of environmental and resource management activities is a complex and challenging area of work. Due to this complexity, assessment is typically limited to measuring outputs that are produced and not on outcomes of activities. Projects often report on numbers of activities, for example, 10 workshops and two seminars provided to cropping farmers. However, information or practices used on farm as a result of participant engagement is often not recorded. It is this information that is often vital in determining the effectiveness of the project in achieving significant environmental and natural resource management gains (Henderson, Morris & Fitz-Gibbon 1987; Patton 2002).

This paper outlines how the Beyond Soilcare project moved beyond counting outputs and utilised an evaluation method called Goal Attainment Scaling (GAS) to demonstrate the impact of the project by providing evidence of landholders' understanding of soil related issues and implementation of informed soil management practices to improve soil health on their properties.

Objectives

The objectives of this paper are to:

- Outline how the GAS technique was implemented to assess the progress of landholders towards adopting soil health related practice change on their properties.
- Report on and discuss the results that demonstrate the impact of the Beyond Soilcare project.
- Highlight lessons learnt from the use of the technique.

Methods

The project used a GAS technique (Kiresuk, Smith & Cardillo 1994) to assess impact. Details on what make up a GAS and how it is developed are discussed below.

What is Goal Attainment Scaling?

GAS is an evaluation methodology that involves the development of an outcome scale to measure an individual's or group's progress towards achieving identified goals.

A GAS is developed to measure the changes in expected results where each goal is scaled at 5 levels: the expected level is defined in the middle of the scale, with 2 lower levels – 'less than expected' and 'much less than expected', and 2 higher levels – 'more than expected' and 'much more than expected' documented on either side.

GASs are generally developed to focus on the goals that reflect targeted areas for change by a specific program. At its simplest, this involves setting goals, implementing a program, determining how well each nominated goal area has been achieved at various times during the life of the program and finally, using this information to determine any changes that are required in future activities (Kiresuk & Lund 1978; Turner-Stokes 2009).

GAS has been commonly used in the mental health fields to assist therapists and patients to assess progress towards achieving individual and organisational goals. GAS has also been used in the fields of education, rehabilitation, medicine, corrections, nursing, social work and chemical dependency (MacKay et al. 1993; Kiresuk, Smith & Cardillo 1994; Sharp & Read 2012). In Australia, GAS was used by *Primary Industries and Resources South Australia* as an evaluation tool that required stakeholders to assess the visual impact of restoration of abandoned well sites in Cooper Basin, South Australia (Primary Industries and Resources South Australia 1998).

Similar scales have been developed in the past by the author of this paper to assess the effectiveness of partnership health (Maskey et al. 2008) and to assess the progress of landholders towards making informed decisions on irrigation modernisation activities (Maskey 2010).

A typical Goal Attainment Scale will look like this:

Date of Initial Observation: / / 20

Date/s of Follow Up Observations: / / 20

Description of the Overall Goal to be Attained:				
	Rating	Goal 1	Goal 2	Goal 3
Weights (if any)				
Description of the best expected result	+2			
Description of a better than expected result	+1			
Description of the expected result	0			
Description of a less than expected result	-1			
Least favourable expected result	-2			
Name of Observer: Date / /20 SCORE:				
Name of Observer: Date / /20 SCORE:				

Kiresuk, Smith & Cardillo (1994) describe the following nine-step process as a training guide to assist in the development of a GAS:

Step 1: Identify the issues that will be the focus of the treatment.
Step 2: Translate the selected problems into at least 3 goals.
Step 3: Choose a brief title for each goal.

Step 4: Select an indicator for each goal.
Step 5: Specify the 'expected' level of outcome for the goal.
Step 6: Review the 'expected' level of outcome.
Step 7: Specify 'somewhat more' and 'somewhat less' than expected level of outcomes for the goal.
Step 8: Specify the 'much more' and 'much less' than expected levels of outcome.
Step 9: Repeat these scaling steps for each of the three or more goals.

While the goals provide the general statement of the program's purpose, the related outcomes reflect expected results at the end of the project. When developing a GAS, goal areas and the related outcomes need to be clear and consistently defined and observable. When developed in this way, others can use the GAS to decide on a score, even if they have not been involved in its preparation providing that they have been adequately trained to interpret the observations appropriately. The use of the scale also allows opportunity to measure change over time by repeating the assessment at various stages throughout the projects life.

Development of Goal Attainment Scale guide for the Beyond Soilcare project

Figure 1 illustrates the latest version of the GAS guide for the Beyond Soilcare Project. This depicts the main goals along the top of the scale with specific aims also identified to help describe the goals. A range of expected levels of outcomes for each of the goals are then documented below to describe the different stages of achievements expected.

The Beyond Soilcare project team, with the assistance of a facilitator, developed the 'GAS Guide for Soilcare project' over a number of workshops in 2015/16. This version is the fifth iteration of the guide.

As a first step, important indicators of the Beyond Soilcare project outcomes were identified for all six goal areas. Several workshops helped to consolidate different views of project outcomes and established a shared understanding within the group. Through this process, the group was able to outline different levels of outcomes for six goals for the Beyond Soilcare project. These six goals include:

1. Landholder understanding soil health/land management issues within their farm context *(Understand and define issues)*.
2. Landholder using soil test results to understand their soil issues *(Objective assessment to understand soil issues)*.
3. Landholder understanding what he/she wants to achieve on their farm by linking soil health issues with farm goals and aspirations *(Define and assess soil goals)*.
4. Landholder actively seeking information and evaluates the usefulness of the information in terms of its relevance to farm situation *(Seek information)*.
5. Landholder involves in soil care forums and activities and share information with others in a group *(Engagement and participation)*.
6. Landholder making soil management decisions on farm *(Practice change on farm)*.

This approach to the development of the GAS process was important as it enabled the project team to internalise and develop a shared understanding of what the outcomes meant to the group and how these outcomes were developed from their contributions.

For each goal area, the group described the aims as the best possible outcomes or observation if the goal was to be achieved. For example, under the 'practice change on farm' goal, the aim described was that a 'landholder implements informed soil management practices on farm'. This is an additional step developed by the Soilcare project team to those identified by Kiresuk, Smith & Cardillo (1994) and helped the team to develop a shared understanding of the possible indicators of each goal area.

In keeping with the process of developing the GAS as described by Kiresuk & Lund (1978), indicators for each goal were established and used to describe outcomes. Development of indicators started with the 'expected level' of outcomes and then indicators that were 'much more' and 'much less' than the expected level.

The development of an agreed GAS required several workshops. These workshops included many discussions about which 'observations' would be used as indicators to assess the subjective attainment of goal areas. The goals need not necessarily be quantified, but it must be stated in such a way so that two independent observers could agree on whether or not it had been attained. The key was to have each outcome level defined by concrete behaviours that could be directly observed or reported.

Figure 1: Goal Attainment Scaling for Soilcare project (version 5)

Goal Attainment Levels	**1. Understand and define soil issues** **Aim:** *Landholder understands the soil issues limiting achievement of their soil goals*	**2. Objective assessment to understand soil issues** **Aim:** *Landholder objectively measures to understand their soil issues*	**3. Define and assess soil goals** **Aim:** *Landholder understands what he/she wants to achieve with their soil on farm.*	**4. Seek information** **Aim:** *Landholder understands the information needed to make a decision and how to evaluate its usefulness to manage their soil issues*	**5. Engagement and participation** **Aim:** *Landholder involved in activities and sharing information with others to improve management of soil issues*	**6. Practice change** **Aim:** *Landholder implements informed soil management practices on farm*
Much more than **EXPECTED** level of outcomes	Landholder can **DESCRIBE** and **EXPLAIN** soil issues and **FULLY UNDERSTANDS** the impacts of issues	Landholder **REGULARLY CONDUCTS** soil tests and objective field assessments and is **CONFIDENT** in interpreting results to understand soil issues	Landholder has **CLEAR** soil goals, **ANALYSES** costs and benefits of goal implementation	Landholder **MEETS** their information needs, **EVALUATES** information usefulness and **INTEGRATES** it into management of soil issues	Landholder regularly **PARTICIPATES** in activities, **CONDUCTS** on farm trials and **SHARES** information with others to improve management of soil issues	Landholder has **MAKES PLANS** to then **ADOPTS** soil management practices and objectively **EVALUATES** change
More than EXPECTED level of outcomes	Landholder can **TALK about** soil issues and has a **REASONABLE UNDERSTANDING** of impacts of issues	Landholder **REGULARLY CONDUCTS** soil tests and objective field assessments but **SOMETIME REQUIRES HELP** to interpreted results	Landholder can **TALK** about soil goals and **MAKES SOME ASSESSMENT** of costs and benefits of goal implementation	Landholder **SEEKS information** and **EVALUATES** its usefulness in management of soil issues	Landholder regularly **PARTICIPATES** in activities and **SHARES** information with others to improve management of soil issues	Landholder **MAKES PLANS** to then **ADOPTS** soil management practices and subjectively **EVALUATES** change
EXPECTED level of outcomes	Landholder is **AWARE** of soil issues and has **SOME UNDERSTANDING** of impacts of issues	Landholder **REGULARLY CONDUCTS** soil tests / or field assessment but **ALWAYS REQUIRES HELP** to interpreted results	Landholder is **THINKING** about soil goals and related costs and benefits of implementation	Landholder **SEEKS INFORMATION** to address management of soil issues	Landholder has some level of **INVOLVEMENT** in activities and **SOME INTERACTION** with others to improve management of soil issues	Landholder **MAKES PLANS** to and then **TRIALS** or **TESTS** management practice options
Less than EXPECTED level of outcomes	Landholder has **SOME AWARENESS** of soil issues but is **UNAWARE** of impacts	Landholder **CONDUCTS** soil tests/ or field assessment on an **AD HOC** basis	Landholder **RECOGNISES** the need to **THINK** about soil goals	Landholder **is THINKING** about seeking information to address management of soil issues	Landholder has **LIMITED INVOLVEMENT** in activities to improve management of soil issues	Landholder **MAKES PLANS** to adopt soil management practices
Much less than EXPECTED level of outcomes	Landholder is **NOT AWARE** of soil issues	Landholder **DOES NOT CONDUCT** soil tests/ or field assessment	Landholder has **NO** soil goals	Landholder is **NOT SEEKING** any information on soil issues	andholder has **NO INVOLVEMENT** in activities to improve management of soil issues	**Landholder** has **NO PLAN** to adopt soil management practices

Use of the Goal Attainment Scale guide

The GAS Guide was incorporated into a broader survey which was used to study landholder attitudes towards soil management and participation in the Beyond Soilcare project (Healy, Forsythe & Murray 2016). In order to generate the Goal Attainment information required, respondents were also asked to indicate the statement that best described their position for all six goals listed in the scale 'at present' and also the statement that best described their position 'before' they had participated in a project activity. It is discussed in the literature that the validity of goal attainment is vastly improved when participants are used as a source of rating and effectively 'self-assessed' (Willer & Miller 1976; Turner-Stokes 2009). An example of the statements used to capture data related to the first goal in the questionnaire is shown in Table 1.

Table 1: Goal Attainment Scale statements for the Soilcare project

This section is about your understanding of soil related issues and their impacts on your farm (goal 1). Please indicate which statement best describes your position at **PRESENT (A)** and also indicate which statement best describes your position **BEFORE (B)** you've participated in the project.

Statements	At present (A)	Before (B)
I am not aware of soil issues on my farm		
I have some awareness of soil issues on farm but I was not aware of their impacts		√
I am/was aware of soil issues on my farm and have some understanding of their impacts		
I was able to talk about the soil issues on my farm and have a reasonable understanding of their impacts	√	
I was able to describe and explain soil issues on my farm and fully understands their impacts		

In total 99 respondents started the survey interview or online questionnaire, although not all of these were completed. In total 89 respondents completed the GAS guide which were used in the data analysis.

Calculation of the Goal Attainment score

Once a GAS has been determined and recorded for 'before' and 'at present' situations, it is possible to calculate a Goal Attainment Score. The Goal Attainment Score is an average of the outcome scores for each of the various goals. Conceptually, the Goal Attainment Score is simply a global index of the degree to which the outcome expectations have been realised (Kiresuk & Lund 1978). The computation of these scores was calculated as outlined in Kiresuk & Lund (1978) and Kiresuk, Smith & Cardillo (1994).

The Goal Attainment Score conversion table for equally weighted scales was used to calculate the score for our purpose which is presented in Table 2. For example, if a participant of a program scores 1, -1, 0, 0, 1, 0 for six goal areas, then the composite goal score for this participant will be 1. A score of 1 in a six-scale form will be 53 as shown in Table 2. The Goal Attainment Score guide with six goals will have the potential scores ranging from 19 to 81.

A Goal Attainment Score of 50 indicates that a series of goals have on average been met at the 'expected' level. A score of less than 50 indicates that attainment has tended to fall short of expectations; a score of more than 50 indicates that it has tended to exceed expectations.

Calculation of the Goal Attainment change score

A Goal Attainment change score is determined by subtracting the summary Goal Attainment score calculated on the basis of the landholder's status 'before' they have participated in a project activity from the summary score obtained and 'at present' after they have participated in a project activity.

A negative score indicates regression; a score near zero indicates little or no change; a positive score indicates progress. The Goal Attainment Change Score can demonstrate the effectiveness of project activities and the project overall.

Table 2. Goal Attainment Score conversion table for equally weighted scales

Total raw score (sum of scale scores)	Number of Scales 1	2	3	4	5	6
-12						19
-11						22
-10					20	24
-9					23	27
-8				21	26	29
-7				25	29	32
-6			23	28	32	35
-5			27	32	35	37
-4		25	32	35	38	40
-3		31	36	39	41	42
-2	30	38	41	43	44	45
-1	40	44	45	46	47	47
0	**50**	**50**	**50**	**50**	**50**	**50**
1	60	56	55	54	53	53
2	70	62	59	57	56	55
3		69	64	61	59	58
4		75	68	65	62	60
5			73	68	65	63
6			77	72	68	65
7				75	71	68
8				79	74	71
9					77	73
10					80	76
11						78
12						81

Source: Kiresuk, Smith & Cardillo (1994)

Analysis

Initially, the percentage of landholders at each level of expectations 'before' and 'after' their participation in project activities were used to summarise the data. Then, the Goal Attainment Scores and the Goal Attainment Change Scores were calculated to demonstrate impacts in six goal areas.

For most of the analysis, percentages and means were used to describe the summary information. Chi-square tests were conducted to examine the association of different levels of expectations of goal areas 'before' and 'after' project implementation. Since the Goal Attainment Scale technique allows the use of the parametric statistical tests to assess the significance of differences in scores associated with a variety of variables, a statistical t-test was also conducted (Turner-Stokes 2010).

Results

This section describes the findings from the GAS analysis which looks at the changes at various levels of expectations for the six goals of the project.

Each of these six goals were analysed to compare the shift in participant goal attainment from the start of the project and their goal attainment post project activities. 'More than expected' and 'much more than expected' were combined to be reported as 'above expectation' and 'less than expected' and 'much less than expected' were reported as 'below expectation'.

Table 3 shows the percentage of project participants at various levels of expectations for the six goal areas. Before participating in project activities, 35 per cent of the participants reported that their understanding of soil health and land management issues were at below expectation level, while 44 per cent reported their understanding were at expected level and 21 per cent reported their understanding at above expectation levels. After participating in project activities, there has been a positive shift in their understanding of soil health issues. This is shown by only three

per cent of respondent reported as being at below expectation level, 35 per cent at expected level and 62 per cent at above expected level. Chi-square tests conducted to examine the association between 'before' and 'after' situations for all six goal areas were significantly different.

Table 3: Per cent of Beyond Soilcare project participants at various levels of expectations

Level of expectation	Understand and define issues		Link with goals and aspirations		Soil test interpretations		Engagement and participation		Seek information		Practice change on farm	
	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After
Above expectation	21	62	26	65	15	38	19	40	23	66	18	37
At expectation level	44	35	34	30	27	20	30	44	43	23	19	28
Below expectation	35	3	40	5	58	42	51	16	34	11	63	35
Chi-square value	28.87		28.23		59.49		28.22		15.11		40.0	
*Statistical significance	significant		significant		significant		significant		significant		significant	

*Significance at 0.01 probability level

Goal Attainment Score results

Table 4 provides the summary Goal Attainment Score attained by landholders for 'before' and 'after' situations. The result demonstrates that there has been a positive shift in the Goal Attainment Scores in all areas when compared between 'before' and 'after' situations. The t-tests demonstrate that the mean scores 'before' and 'after' participating in the project were significantly different indicating a positive impact of the Beyond Soilcare project.

Table 4: Goal Attainment Score of participants 'Before' and 'After' attending the Beyond Soilcare program

	Before	After
GAS score	44.47	56.45
Standard deviation	12.33	11.89
t statistic	10.53	
Significance*	Significant	

*Significance at 0.01 probability level

Overall 36 per cent had a score of 50 or more 'before' participating in project activities compared to 75 per cent who scored 50 or more 'after' participating in project activities (Table 5).

Table 5: Comparison of GAS score for less than expected level of outcomes vs expected level of outcomes and above (%)

GAS score	Before	After
GAS score of less than 50	64	25
GAS score of 50 and more	36	75

Goal Attainment Change Score results

A Goal Attainment Change Score is determined by subtracting the summary Goal Attainment Score calculated on the basis of the participant's status 'before' the intervention from the summary score based on the follow-up 'after' the intervention.

Overall 83 per cent of the landholders had positive Goal Attainment Change Scores indicating progress in the attainment of goals after participating in project activities. However, there were still some (17 per cent) who had not changed or identified negative scores indicating regression. This could mean that these landholders observed to be less inclined to make changes to achieve outcomes as expected by the project (Table 6).

Table 6: Per cent of respondents with positive or negative Goal Attainment Change Score (%)

Positive or negative Goal Attainment change score	%
Positive Goal Attainment change score	83
No change or negative Goal Attainment change score	17

Discussion

Goal Attainment Scaling is a methodology that allows monitoring of how well a program or project is achieving its 'expected' results. This methodology was used to assess soil health outcomes by participating landholders in Beyond Soilcare project activities. Assessing the impact of environmental and resource management works is a complex and challenging area of work. Identifying sufficiently observable changes at different levels of outcomes for this study was made possible by visiting and re-visiting project outcomes and the team agreeing to develop a shared understanding of what observable outcomes should be achieved at different levels of outcomes for all the goal areas. The essential characteristics identified for a successful project included the detection of goals defined by concrete behaviours arranged along a hierarchy of possible outcomes.

The following lessons are associated with developing this GAS:

- **Shared understanding**: The development of the Scale not only helped the project team to assess the strengths and the weaknesses of the project approach, but it also helped the team to develop a shared understanding of 'what a successful project looks like'. This process allowed members of the project team to discuss and describe what 'success looks like in observable behaviour form' and then to develop specific goals and aims that provided them with a clear picture of the behaviours and attitudes exhibited by landholders who participated in project activities. This process helped team members to prepare the operational definition of the complex concept for 'soil health outcomes'.
- **Rigour in the process**: A draft GAS for soil health outcomes was initially developed by an experienced facilitator. This draft was communicated to the project team. The whole team was involved in the further development of this Scale. This involvement added rigour through discussion of different people's ideas and opinions. The process helped team members to internalise the concept of 'soil health outcomes' through active participation in the development of the Scale. By incorporating diverse views, a much richer definition was developed by the group than had been available in the initial draft of the Scale.
- **Clear vision of soil health outcomes**: The project team now has a shared understanding of the content and concepts referred to in the GAS. Team members can clearly understand what to look for as indicators of soil health outcomes and have a clear view of the goals that they are working to achieve.
- **Modification of the process to fit the situation:** Some changes were made to the nine step process identified by Kiresuk, Smith & Cardillo (1994). The project team worked on specifying an aim for each of the goal areas before identifying the various 'expected' indicators. This helped the team to focus on goals much more rigorously.
- **Goal Attainment Scale ratings are time-efficient and user friendly**: The project team mentioned that after its initial development phase, the use the GAS technique, compared to other evaluation techniques, is less labour intensive, easy to implement and relatively easy to analyse for accurately monitoring intervention outcomes.
- **Support from other methods**: GAS provided us with 'raw data' on the progress of soil health outcomes at any given point. As with other evaluation data, the GAS data must be analysed, interpreted and assessed for reliability and validity (Willer & Miller 1976; Schlosser 2004). Our experience is that this tool should not be used as the only source of evaluation and should be used in conjunction with other measures of outcomes (Turner-Stokes 2010). Use of two or more methods to collect and analyse data will help in the 'triangulation' process to remove biases from only one technique (Patton 2002).

Conclusion

Assessing the impact of the Beyond Soilcare project is an important area of work to determine the extent to which landholders have made practical soil health related changes on farm. The GAS helped measure achievement (or otherwise) of goals set 'before' and 'after' the implementation of the project.

This study has demonstrated a positive shift in the level of 'expected outcomes' in all six goal areas after participating in project activities. The Goal Attainment Scores 'before' and 'after' participating in project activities were statistically significant indicating the project helped landholders understand soil health issues on farm.

The study showed that 83 per cent of the landholders had positive Goal Attainment Change scores indicating progress in the attainment of goals after participating in the project. There were 17 per cent who had not changed or had negative scores indicating that they were less inclined to make changes to achieve outcomes as expected by the project.

Compared to other evaluation techniques, the development of GAS involves time commitment from the project team. However, the process of developing the GAS has provided an opportunity to build a shared understanding of what the project is trying to achieve and what sufficiently observable outcomes that could be measured. After its initial development phase, it is easy to implement and relatively easy to analyse.

The success in the use of the GAS in this study should not be used as a panacea for other projects or programs. As discussed, the preparation of the GAS guide is time consuming and any compromise in the guide construction can limit the validity and reliability of this technique.

Even though this technique is reliably robust, it is recommended that other supporting techniques be explored to assist in the evaluation of the work. The use of focus groups which can be used to complement the GAS technique can provide rich qualitative data.

Reference

Healy, D, Forsythe, A & Murray, L 2016, *Soil health impact survey*, First Person Consulting Pty. Ltd., Melbourne.

Henderson, ME, Morris, LL & Fitz-Gibbon, CT 1987, *How to measure attitudes*, Sage Publications, Thousand Oakes.

Kiresuk, T & Lund, S 1978, 'Goal attainment scaling' in *Evaluation of human services programs*, eds, C. Attkisson, W. Hargreaves, M. Horowitz, and J. Sorensen, Academic press, New York, pp. 341-369.

Kiresuk, T, Smith, A & Cardillo, J 1994, *Goal attainment scaling: applications, theory and measurement*, Lawrence Erlbaum, Hillsdale.

MacKay, G, McCool, S, Cheseldine, S & McCartney, E 1993, 'Goal attainment scaling: a technique for evaluating conductive education', *British Journal of Special Education*, vol. 20, no. 4, pp. 143-147.

Maskey, R, Lawler, D, Cumming, B & Sampson, K 2008, 'Assessment of catchment partnership health: using the goal attainment scaling technique', paper presented to the *Australasian Evaluation Society International Conference* held on the 8-9th September at Perth, Western Australia.

Maskey, R 2010, *Evaluation of farm irrigation assessment: using goal attainment scale technique*, Department of Primary Industries, Tatura.

Patton, M 2002, *Qualitative research & evaluation methods*, Sage Publications, Thousand Oakes.

Primary Industries and Resources South Australia 1998*, Field guide for the environmental assessment of abandoned petroleum well sites in the Cooper Basin*, PIRSA, Adelaide, South Australia.

Schlosser, RW 2004, 'Goal attainment scaling as a clinical measurement technique in communication disorders: a critical review', *Journal of Communication Disorders*, vol. 37, pp. 217-239.

Sharp, C & Read, P 2012, 'Goal attainment scaling in early childhood intervention: issues for implementation and evaluation, *Evaluation Journal of Australasia*, vol.11, no. 2, pp. 31-41.

Turner-Stokes, L 2009, 'Goal attainment scaling (GAS) in rehabilitation: a practical guide', *Clinical Rehabilitation*, vol. 23, pp. 362-370.

Turner-Stokes, L 2010, 'Goal attainment scaling; a direct comparison of alternative rating methods', *Clinical Rehabilitation*, vol. 24, no. 1, pp. 66-73.

Willer, B & Miller, G 1976, 'On the validity of goal attainment scaling as an outcome measure in mental health', *American Journal of Public Health*, vol. 66, no. 12, pp. 1197-1198.