Devising Practical Environmental Measures for Golf Courses in Italy

Duncan B Thomas
PI 3500159
September 2006

This dissertation is submitted in partial fulfilment of the requirements for the MSc in Environmental Decision Making
Abstract

Golf is an increasingly popular sport in Italy, player numbers are growing and new courses are being constructed. Against this background there is growing concern over the use of resources to maintain large areas of fine turfgrass, in particular the quantities of pesticides used and the amount of water consumed for irrigation purposes.

The aim of the research was to devise “practical” environmental measures clubs could adopt as a first step. The subject was approached from two positions, namely expert opinion and the views of superintendents in the field.

Expert consensus following two rounds of questionnaires pointed to “practical” environmental measures needing to be suitable and to fit in to the clubs budget and the maintenance programme to be adopted. Experts cautioned that many were site specific but where the superintendent was competent, owned the measure and had autonomy (in the case of nature conservation, turf culture and education) then the measure had a greater chance of being “practical”. They also put forward ideas as to why measures were “practical” at clubs with a good environmental performance.

Superintendents and managers were then interviewed at six clubs as part of a cross sectional survey. It was established that the majority of clubs were obliged for commercial reasons to provide good playing conditions in order to retain club members. It was confirmed that nature conservation and turf culture were the areas where the superintendent had the greatest influence. Further analysis revealed that the “owners” in the situation, the golfers were the main barrier to the uptake of measures demanding playability and blocking anything that did not fit into this parameter. Within this stance it was found that there were a range of “practical” environmental measures that a motivated superintendent acting within his job remit could introduce.
Contents
Figures iv
Tables v
Glossary vi

Chapter 1 - Introduction
1.1 Background to the problem/issue 1
1.2 Justification for the research 4
1.3 Aims and objectives 4
1.4 Definitions 5
1.5 Scope of the research 5
1.6 Outline of the dissertation 6

Chapter 2 - Research Definition
2.1 The practical problem 8
2.2 Existing relevant knowledge 12
2.3 Research questions 15

Chapter 3 - Methodology
3.1 Methods and techniques selected 17
3.2 Justification 17
3.3 Research procedures 22
3.4 Ethical considerations 27

Chapter 4 - Analysis and interpretation
4.1 Summary of data collected 29
4.2 Data analysis 41
4.3 Interpretation in relation to research questions 49
4.4 Interpretation in relation to research aim 51

Chapter 5 - Conclusions
5.1 Conclusions about the research questions 52
5.2 Conclusions about the research aim 53
5.3 Further work 53
5.4 Implications of the research 53

References 55

Appendices
Appendix 1 “Practical” best practice measures 58
Appendix 2 The Delphi questions round 1 65
Appendix 3 Example of a reply from candidate C of the Delphi panel together with the associated coding 68
Appendix 4 Superintendent interview question sheets 69
Interview schedules 72
Appendix 5 Observational verification, an example of a completed sheet 73
### Figures

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Golf hole 1</td>
<td>5</td>
</tr>
<tr>
<td>2.1</td>
<td>Stages involved in attaining “Committed to Green” certification</td>
<td>10</td>
</tr>
<tr>
<td>2.2</td>
<td>A systems map showing competing factors in golf course management</td>
<td>11</td>
</tr>
<tr>
<td>3.1</td>
<td>The conventional stages of SSM</td>
<td>19</td>
</tr>
<tr>
<td>3.2</td>
<td>Map showing the geographical distribution of the clubs</td>
<td>21</td>
</tr>
<tr>
<td>3.3</td>
<td>A summary of the research</td>
<td>28</td>
</tr>
<tr>
<td>4.1</td>
<td>Environmental categories and ease of introducing measures</td>
<td>31</td>
</tr>
<tr>
<td>4.2</td>
<td>The uptake of nature conservation best practice</td>
<td>33</td>
</tr>
<tr>
<td>4.3</td>
<td>The uptake of turfgrass best practice</td>
<td>35</td>
</tr>
<tr>
<td>4.4</td>
<td>Water resource management</td>
<td>39</td>
</tr>
<tr>
<td>4.5</td>
<td>Uptake of environmental best practice measures introduced per club</td>
<td>40</td>
</tr>
<tr>
<td>4.6</td>
<td>Conceptual model of “practical” grouped under CATWOE themes</td>
<td>41</td>
</tr>
<tr>
<td>4.7</td>
<td>Rich picture showing some of the views surrounding the introduction of</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td>environmental measures.</td>
<td></td>
</tr>
<tr>
<td>4.8</td>
<td>Conceptual model from the root definition, S1</td>
<td>43</td>
</tr>
<tr>
<td>4.9</td>
<td>Conceptual model S2, where the introduction of an environmental</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td>measure could be accepted by the “owners”</td>
<td></td>
</tr>
<tr>
<td>4.10</td>
<td>“Top Notch Club”</td>
<td>46</td>
</tr>
<tr>
<td>4.11</td>
<td>“Green Club 1”</td>
<td>47</td>
</tr>
<tr>
<td>4.12</td>
<td>“Green Club 2”</td>
<td>48</td>
</tr>
<tr>
<td>Tables</td>
<td>Page</td>
<td></td>
</tr>
<tr>
<td>-----------------------------------------------------------------------</td>
<td>------</td>
<td></td>
</tr>
<tr>
<td>2.1 Time line of golf &amp; environmental efforts in Italy</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>3.1 Delphi panel members</td>
<td>23</td>
<td></td>
</tr>
<tr>
<td>3.2 CATWOE analysis</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>3.3 The clubs chosen</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>4.1 Factors considered important in making a measure “practical”</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>4.2 Significant Individual measures</td>
<td>31</td>
<td></td>
</tr>
<tr>
<td>4.3 CATWOE analysis system S1</td>
<td>43</td>
<td></td>
</tr>
<tr>
<td>4.4 CATWOE analysis of “Top Notch” Club</td>
<td>46</td>
<td></td>
</tr>
<tr>
<td>4.5 CATWOE analysis “Green Club 1”</td>
<td>48</td>
<td></td>
</tr>
</tbody>
</table>
Glossary

**Bunkers**
An area of ground that is lower than the surrounds, bare of vegetation and carpeted with a layer of sand.

**Cultural practices**
Using mechanical means to deal with a turf problem or to encourage optimum growth.

**Environmental management system**
A management system that provides the phasing of planned activities, processes, responsibility for achieving and developing an environmental policy.

**Environmental policy**
A declaration by a company in relation to its aims and principles regarding its environmental performance.

**Greens committee**
Elected members of a golf club who are responsible for decisions affecting the maintenance and management of the course.

**Hollow coring**
A way of cultivating the turf whereby small cores of 5-25 mm are removed to be replaced by free draining topdressing material.

**Hydraulic conductivity**
The ability of water to move through the soil.

**Kolf**
Means “club” in ancient Dutch.

**Links course**
It originally meant a seaside course in Scotland, it is now used to mean any golf course near the sea that is flat and has sandy soil.

**Leaching**
The removal of soluble fertiliser constituents by a percolating liquid (normally water).

**Lie**
The position in which the ball is found on the ground.

**Rough**
Vegetation (usually long grass) adjacent to the fairway, greens and tees.

**Slow release fertiliser**
Fertiliser that releases nutrients in controlled amounts over a period of time.

**Speed of greens**
The speed that a ball rolls across the greens, the faster the greater the degree of difficulty.

**Semi rough**
An area of grass of intermediate height next to the fairway, greens, tees.

**Spiking**
A method of turf cultivation in which solid or flat pointed blades penetrate the soil to allow air and water to enter.

**Systems map**
A snapshot of a situation at a particular moment in time. It shows the elements of the situation from the perspective of the person who drew it.

**Tee**
The area generally of fine grass, from which you must first hit your ball. Also called teeing ground.

**Topdressing**
A prepared mix spread on the turf grass surface and worked in by brushing, matting, raking or irrigating.
Chapter 1 Introduction

1.1 Background to the problem/issue

Golf is a popular sport played by people of all ages. There are now 5,411 courses in Europe with five million players. In the last ten years 1,738 courses have been constructed and club membership has increased by 110%. This trend is predicted to continue (Golf Research Group, 2005). The accepted environmental issues as defined by the Royal and Ancient Golf Club (R & A) are linked to water consumption, chemical use, ecology and climate change (R & A, 2004).

1.1.1 The development of the game of golf

The origins of golf are disputed. Some point to the game starting when shepherds in the hills above Rome used their crooks to hit stones, others to the Dutch game of Kolf. Whether the pastime travelled to Britain and then Scotland with the Roman battalions or due to trade with Europe is also open to dispute. Nonetheless golf was nurtured in Scotland where it was played for centuries. Courses were created on natural coastal terrain, here the grass was watered when it rained and mown when the sheep chose to graze (McGuire & McGuire, 1997, p17). Courses were referred to as “links and were characterised by fine grasses growing on sandy soils “of little agricultural value”. As the game spread less suitable sites and soils were used for construction” (Bowcock, 2004, p82).

Demand for golf increased in the 1950’s due to increased leisure time and improved grass maintenance technology (Moore, 2004, p90). With the result that courses were built in many different locations and on varying soil types. The last golf boom occurred in Britain during the period 1980-1990 where courses were built in attractive settings, often stately homes (Arthur, 2003, p17). This trend is mirrored in Italy with courses being constructed in Sicily, particularly at Lamezia where it is hoped to host 90,000 tourists annually (Svillupo Italia, 2003).

1.1.2 The emergence of technical problems

More players stressed courses in particular grass had to cope with continual wear and poor soil conditions due to increased traffic. This often led to the short term fix of higher inputs of water and fertiliser to relieve the symptoms. In the longer term managers resorted to engineering solutions. Peter Jeffard (2004, p65) in an article entitled “Construction Materials and Technology” comments on the fact that natural soil profiles do not drain sufficiently to support intense traffic, as the space between soil particles is limited. Most modern greens are now constructed on free draining graded
sand, with 180 metres cubed being used for the average green (600 metres squared) at an average cost of £30,000 per green (United States Golf Association, 2004). Yet growing grass on sand is difficult, as there is no soil buffer (where water and nutrients remain in suspension within the narrow soil pore spaces). Swards grown on sand having no reserves therefore require considerable management including timely and controlled applications of fertiliser, pesticide, and water. If these are applied at the wrong time or in heavy doses, run off and pollution occurs.

1.1.3 The use of resources

A factor that has led to increased use of resources is the advent of television. Andrew Mottram (2004, p63) comments on increased coverage of golfing events by the press (where courses are in top condition) leading to many clubs applying too much water and fertiliser to emulate them. A point taken up by Malcolm Peake (2005, p11) when he refers to the fact that many courses strive for “perceived” perfection. The rising aspirations of players are not confined to Britain. Cagatti et al points to enhanced social expectations among Italian golfers leading to demands for clubs to produce excellent turf and wide open intensively cultivated spaces (Cagatti et al, 1999, p30).

Of the inputs to golf courses, perhaps the most contentious is the use of water. This is highlighted by a recent example in Britain where, in the face of water shortages and hosepipe bans in March 2006, one club was vandalised and four others threatened by a protest group who demanded they stop irrigation (Burleigh, 2006). In the Mediterranean water consumption is a major issue. The World Wildlife Fund in a report issued in 2004 point to a crisis with resources being threatened by growth in facilities provided for tourists, particularly golf courses. The document mentions the fact that an average club can use “1 million cubic metres of water a year” enough for 12,000 inhabitants (World Wildlife Fund, 2004). In Italy there is a deepening crisis, the International Commission on Irrigation and Drainage (ICID) mentions that drought in the North has lowered water tables and concentrated pollutants (ICID, 2006).

1.1.4 Golf and society

Sustainability issues are important and there is considerable pressure for clubs to be open to a range of other stakeholders (ramblers, nature organisations, cyclists). Committed To Green (CTG) the European environmental certification initiative, detailed that improvements should be made in communication and public awareness (Committed To Green, 2002). Recent concerns have led to the latest environmental initiative for golf, The Golf Environment Europe organisation stating that “the future of golf lies in its ability to deliver a balanced range of environmental social and
economic benefits” (Golf Environment Europe, 2006). Italy has a particular problem where course loadings are low and golf is seen as elite. According to figures published in 2003, there were 70,237 players registered with the federation (3,784 new members in 2002/3) and there were 303 registered clubs (18 new ones). What is unusual is that the percentage of players per population in Italy was .12% (.945% for the rest of Europe). The medium number of players per course was 234, which was far behind the European Average of 1,031 (Golf Italia, 2003).

1.1.5 Environmental Management

In the light of these problems it would appear that an Environmental Management System (EMS) would help to deal with these problem in a systematic and measured way. The Committed to Green Scheme has emphasised over the years the importance of carrying out an environmental review and the implementation of an EMS as a means to proven environmental performance (Committed To Green, 2003). Recently the Golf Environment Europe have stressed the value of clubs being managed to Eco Management and Auditing standards of The European Community which calls for publication of environmental performance as well as running an EMS.

Yet this approach has been problematic, in Europe there are just 35 environmentally certified clubs under the CTG scheme. In Italy the Italian Golf Federation lists two clubs with international certification and three with national awards out of 320 (Italian Golf Federation, 2005). It appears to be no coincidence that among the clubs certified a number have full time environmental managers. But what about ordinary clubs with limited resources? It would help greatly if simple easily quantified practical measures could be detailed to get clubs started. David Stubbs in 1997 referred to the need for clubs to commence with environmental measures “of immediate interest” or where “most progress can be made” (Stubbs, 1997, p16). This forms the purpose of the research.

To sum up, the situation is complex; golf course management causes “infringements of natural systems”. These can be classified as environmental problems as they result in a “change of state in the physical environment which is brought about by human interference with the physical environment, and have effects which society deems unacceptable in the light of shared norms” (Sloep et al, in Glasbergen and Bowers eds, 1995).
1.2 Justification for the research

Publishing practical environmental measures can:

- Show clubs where the easiest, quickest and most popular changes can be made, thereby enabling a rapid improvement in environmental performance.
- Act as an educational/awareness raising tool for the adoption of further environmental initiatives.
- Help policy makers to plan, by revealing what is feasible.
- Identify areas where different practices will allow savings to be made on resources used.
- Also be relevant in other land management contexts (as demonstrated by the Audubon programme) namely cemeteries, arboreta and large parks (Audubon International, 2006).

If measures are implemented they will:

- Increase habitat so benefiting flora and fauna.
- Act as a first step for clubs to publicise their environmental credentials.

1.3 Aim and Objectives

The Aim was as follows:

- To produce recommendations for carrying out practical environmental measures at golf courses in Italy.

The objectives associated with the aims were:

- To draw up a list of easy to introduce best environmental practice under appropriate headings.
- To consult (on two occasions) experts in Italy, Great Britain and America, to elicit their opinions on what makes something practical, defining and then synthesising the answers.
- To conduct semi structured interviews with two key stakeholders at one environmentally certified golf course, and five other clubs in order to gather qualitative data regarding best
environmental practice introduction from superintendents and to gather background information from managers.

- To categorise and analyse the data taking into consideration comments by the experts, to come to a conclusion about the factors that make environmental measures “practical”.

1.4 Definition

Golf courses are typically made up of eighteen holes occupying on average sixty hectares of land. Each hole consists of a tee (a flat area from which the ball is initially hit). The word “fairway” is used to describe intermediate turf areas where the ball should land after having been hit from the tee. Finally there is the “green” which is intensively managed and where the cup is situated. The object of the game being to get the ball into the cup. The length of each hole varies from 120 metres to 600. Figure 1.1 shows a typical golf hole.

![Figure 1.1 Golf Hole 1](image)

1.5 Scope of the research

The research has looked at best practice, in terms of its practical application. Taking best practice as advocated by:- The United States Golf Association, The R & A, Audubon Association, Sports Turf Research Institute, Committed to Green, Italian Golf Federation and various authors and checking its practicability. To this end experts, superintendents and managers have been consulted. Apart from technical aspects the research has also considered the social factors that come into play in any
club and that may facilitate or block measures. In particular the underlying power relationships have been considered. Environmental management systems have not been covered in detail as they are concerned with the systematic uptake of best practice and do not reveal why some clubs take an environmental stance and others do not. Likewise environmental strategy, fragmentation of effort and general policy have only been considered briefly.

1.6 Outline of the dissertation

Chapter one traces the development of game of golf. How its popularity led to the emergence of technical problems (resource use and pollution) as land was used to accommodate courses in varying locations. The social factors that have accentuated this are then covered. The various attempts to redress the issues are outlined, particularly the efforts of CTG. The research is justified in terms of the benefits that will ensue from the publication of “practical” environmental measures. Lastly the aims and objectives are detailed.

Chapter two defines the research, in particular it details the practical problem in Italy. Issues such as the uptake of best practice and relations with the local community are outlined. The extent of existing relevant knowledge is explored in relation to golf and wildlife, agronomic factors, pesticides and fertilisers, water use and best practice uptake. The research questions then emerge from the gaps in existing relevant knowledge.

Chapter three details the methodology namely The Delphi and cross-sectional survey. The methods are justified in terms of their relevance. The way the research was carried out is then detailed and the chapter ends with a list of the ethical considerations.

Chapter four shows a summary of the data obtained. The results of the Delphi findings are displayed in tabulated form using graphs where possible. Results from the interviews regarding best practice uptake are also displayed in graphic form with explanatory text. Analysis of the Delphi comments using soft systems methodology follows with models and drawings being used to provide detail. Analysis follows of the interview findings which are compared with the models drawn up from the Delphi study. Finally the findings are interpreted in the light of the research questions and aim.
Chapter five draws conclusions about the research questions R1-4. The research aim is then considered and a statement is given about the generic nature of environmental measures and the relevance of context in relation to their uptake. Further research, building on the findings is put forward. Lastly the wider implications of the research are explored, together with it’s relevance to other fields of interest.

The document ends with a list of references and a series of appendices which outline individual environmental measures clubs can adopt and give details of the activities that formed the research procedures.
Chapter 2 Research definition

2.1 The practical problem

There have been some successes regarding the relationship between golf and the environment in Italy. These include sensitive landscaping using indigenous heather and savoury at Acaya Golf Course in South Italy (Ippolito et al, 2005, p72). There are the clubs that have attained national and international certification under the CTG scheme. Finally drought resistant Bermuda grass has been used successfully at Barialto Golf Course in Puglia and on courses in Sicily (personal observation). But although these are laudable they are isolated examples. Two relevant issues remain, these are:

- The uptake of best practice and how to increase participation in environmental management programmes.
- How to improve relations with the local community and the wider public.

Dealing with these in turn:

2.1.1 The uptake of best practice

There has been a concentrated effort to improve golf’s performance. The development of environmental practice has followed the sequence as shown in Table 2.1

Table 2.1 Time line of golf & environmental efforts in Italy (Italian Golf Federation, 2006, Committed to Green, 2002, Golf Environment Europe, 2006)

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
<th>Objectives</th>
<th>Programmes/notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1989</td>
<td>Nature Conservation Council UK publish “Managing Golf’s Natural Heritage”.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/1994</td>
<td>The Royal and Ancient Golf Club of St Andrews (R&amp;A), The Professional Golf Association Tour (PGA), The European Golf Association (EGA) formed the European Golf Association Ecology Unit.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1997</td>
<td>The Ecology Unit published the “Committed To Green” manual detailing the certification scheme.</td>
<td></td>
<td>CTG adopts the framework of an internationally recognised EMS, with awards for performance.</td>
</tr>
<tr>
<td>11/1999</td>
<td>Valderamma declaration was signed, leading to the adoption of the CTG accreditation scheme</td>
<td>To promote education, respect for the environment, conservation of wildlife and</td>
<td>This was launched at the occasion of the Ryder Cup</td>
</tr>
</tbody>
</table>

8
<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
<th>Objectives</th>
<th>Programmes/notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>12/1999</td>
<td>The Italian Golf Federation accepted Valderamma agreement.</td>
<td>The Italian objective is to obtain a permanent improvement between golf and the surrounding landscape.</td>
<td>CTG certification programme of six phases (including establishing an Environmental Management Plan) is established concerning eight categories of environmental performance.</td>
</tr>
<tr>
<td>12/1999</td>
<td>European Ecology Unit ceases to function.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10/2001</td>
<td>Meetings of the National Committee for CTG in Italy.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5/2002</td>
<td>In Italy two clubs gain European Certification under CTG.</td>
<td></td>
<td>Verona and Curimate</td>
</tr>
<tr>
<td>9/2003</td>
<td>Seventy clubs have signed up in Italy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2/2004</td>
<td>Launch of the Royal and Ancient web site detailing best practice.</td>
<td>The R&amp;A definition of sustainability is given.</td>
<td>The site includes substantial information on best practice.</td>
</tr>
<tr>
<td>02/2006</td>
<td>Seventy eight clubs have signed up to CTG. in Italy, two have gained international certification and three national certification</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6/2006</td>
<td>Golf Environment Europe, the new golf and environment organisation, supported by golfing bodies, EU and environmental organisations launches its web site on 7th of June</td>
<td>Provide information that will be practical Provide external organisations with a platform for communication Promote examples of environmental sustainability Act as a shop window</td>
<td>Committed to green certification is now referred to as the ECOManagement award. A lot of information is available free of charge, including an environmental audit, bench marking scheme, and environmental management handbook. There are now thirty ECOManagement clubs in seven countries</td>
</tr>
</tbody>
</table>
On the face of it the CTG programme (as it is still referred to in Italy) shown in Figure 2.1, is thorough and is based on the voluntary principles as outlined in The European Union’s Eco Management and Audit Scheme. Yet the number of clubs gaining certification following the stages shown amounts to a very small percentage overall. This can be viewed in the context of clubs dealing with many priorities with which the CTG scheme must compete. In Italy the situation is compounded because secretaries are also responsible for overseeing golf tournaments as referees. They also manage all the facilities of the club which include the course, clubhouse (which often includes a swimming pool, restaurant, golf shop) and budget (Croce & DeLuca, 1998, p11-12).

The competing factors thus make it difficult for clubs to keep focused on CTG best practice. Figure 2.2. (a systems map) shows some those affecting clubs. Unfortunately priorities can change overnight through changes in legislation, climatic factors or the greens committee being reformed.
A possible explanation for the lack of proven uptake of the CTG scheme is given by Williamson & Lynch-wood in a study “A New Paradigm for Small Medium Enterprise’s Environmental Practice” where it is explained that many small/medium sized businesses (categories that many clubs fit into) have little spare time (2001, p430-431).

Another possible reason could be that environmental awareness and education are not taking place among stakeholders. Antonio M. Sánchez Hernández as part of a thesis on the CTG scheme conducted at Lund University in Sweden concluded that environmental awareness through education among golfers, managers, staff and three other groups was essential for them to accept environmental measures and hence improvements in performance (Sánchez Hernández, 1998, p57).

Although few clubs have attained certification many (seventy eight clubs in Italy) have registered with the CTG programme. Are clubs already employing best practice? Could they be persuaded to do more? Is the system of registering too complex and time consuming?.
2.1.2 Relations with the community

There is an active anti golf lobby in Italy. There have been thirty protests against new courses throughout the peninsula as described by The Anti Golf Movement (Anti Golf Movement Italy, 2004). These include:

- A Plan to double the size of Padricino golf club was opposed by the WWF due to worries over water consumption and loss of habitat (Predonzan, 2002).
- Plans to create a new club at Val Canali in the Dolomites met opposition from The Alpine Conservation Society the result being that the environmental impact assessment was not accepted (SAT, 2003)
- Italy was cited by the EEC for infraction of the habitat directive 92/43/CEE art.10 & 6 in allowing the development of Golf “Is Arenas” (Parchi Regione Puglia, 2003, p3).

Relations with the local community are considered most important. The organisation Golf Environment Europe states that for golf to be sustainable “it must integrate environmental stewardship, economic development and the well being of all people not just today but for generations to come”. There is scope for involving other stakeholders in golf courses and some clubs have made progress in this area. Yet the cases against new golf developments in Italy show that improvements are needed in golf’s public image, the difficulty is how to do so when golf is seen as an elite sport (due to the number of clubs in exotic locations) by players and the public alike (Croce & DeLuca, 1998, p11).

2.2 Existing relevant knowledge

There have been many academic studies on golf courses and the environment, both in Italy and abroad. The research has resulted in the publication of best practice and can be broadly grouped under the following headings:

- Golf courses and wildlife.
- Agronomic factors, the management of turf including the selection of turfgrass, irrigation, woodland management, hedgerow treatment and landscaping.
- The effects of pesticides and fertilisers on soil and water quality.
2.2.1 Golf courses and wildlife

A Study by Green and Marshall found a number of habitat types on golf courses in Kent; it concluded that golf courses “provide an opportunity for practical wildlife conservation” (1987, p153). Research by the Golf Federation in Italy looked at the role of courses in the conservation of avian fauna, 110 species were found at a representative 23 clubs. The study concluded that providing the course was managed with sensitivity to the surrounding environment, then it provided a valuable haven to wildlife (Italian Golf Federation, 2001). Yet this laudable aim is often compromised by the demands of golfers for improved playability and turf quality (Peake, 2001, p61).

2.2.2 Agronomic factors

Agronomic best practice for turf follows years of experimentation. The R&A list twenty eight organisations around the world that are involved in improving turf for recreational uses (Royal and Ancient Golf Club, 2004). The Italian Federation has produced specific guidelines for the environmentally friendly maintenance of golf courses (GLGA, 1999). Details are given of turf cutting heights together with fertiliser regimes and cultural practices. There is a comprehensive list of best practice including elements relating to arboriculture and nature conservation practices published by the R&A (2004). But superintendents may have difficulty implementing the recommendations due to lack of time, conflicting priorities, lack of resources or different perspectives of maintenance.

2.2.3 Pesticides and fertilisers

The effects of pesticides and the fate of fertiliser have been extensively studied. Cohen et al, in a ground water monitoring study in nineteen wells, mentions pesticides and related compounds found around the greens and the tee areas. The since banned chemical Chlordane (for worm control) was found as well as solutions of Nitrates (1990, p171). The issue is summed up by Balough and Walker (1992, p95) the conclusion being that chemical movement in the soil is related to soil texture, degree of conductivity of soil water, subsurface movement of water, nitrogen source, formulation
rate, timing irrigation and rainfall. Studies by Petrovic (1990) are mentioned that give rise to best practice in applying fertiliser, namely slow release sources (which are costly) and the timing of applications. However the number of variable factors is considerable; is a superintendent able to effectively monitor them? Player pressure, in particular the need for excellence when competitions occur, may compromise carefully laid out plans.

Leaching has particular relevance to Italy, where the greens are subject to heavy applications of pesticide and fertiliser. Pesticide application rates of up to 22kg of active ingredient per hectare have been recorded on greens in the South. Fertiliser rates per hectare to greens of 304kg (N), 43kg (P₂O₅) and 256kg (K₂O) have also been noted, although use per course appears to be low similar to that used for forage crops agriculturally (Caggiati et al, 1999, p58-59). What can be done to improve this situation?

2.2.4 Water use

Research by Plan Bleu points to supplies per capita increasing due to the declining population, yet describes reduced delivery in the South of Italy due to “cyclical shortage” and where “demand exceeds resources” as demonstrated in areas where there are tourist resorts (Plan Bleu, 2002). Research has been conducted on saving water by growing turfgrass varieties that are adapted to warm conditions, which revealed that irrigation could be reduced by 33% (Cereti et al, 2004). Yet changing the grass causes great upheaval and golfers could be tempted to play elsewhere if standards were effected..

2.2.5 Best practice measures and their uptake

Best management practices are defined as “a set of guidelines that recognises the full range of variables involved in land management with the aim of maximising environmental benefits compatible with sound golf course management” (Stubbs, 1995, p63). Unfortunately while there remain different perspectives of what sound golf course management implies, notably with the differences in approach between low input “links” courses and the glossy magazine or “Augusta” models, then there will be different interpretations of best practice. The situation is further complicated by the sheer choice of possible practices available from the Italian Golf Federation, the R&A, Audubon International, the Sports Turf Research Institute and the United States Golf Association as well as numerous books written on the subject. Environmental management systems
documenting the uptake of best practice are available, in particular the R&A best practice and case studies as well as the CTG scheme. However although these ideal models are put forward there has been little investigation as to what makes a measure “practical”.

There have been various pieces written on best “practical” environmental practice. An article entitled “Practical environmental responsibility” highlights practical steps that can be implemented at most courses these include:

- Raising cutting heights.
- Providing good air movement.
- Proper irrigation design.
- Choosing the right grasses for the locale.
- Properly addressing fertility needs.
- Providing surface and internal drainage.
- Tolerating less than perfect swards.
- Monitoring for pests and diseases.

The claim is that these measures will result in a reduction in chemicals used, reduce maintenance costs and result in less water being used. The premise being that better quality turf will be stronger requiring less water and fertiliser (Moore, 1992, p59). But how easy is it to get golfers to tolerate less than perfect swards or to provide drainage to an established course?

Another article “Practical steps all golf courses can take for the environment” looks on the surface to provide some answers in that it gives a comprehensive list of measures (Anon, 1999, p54). A closer inspection reveals that it is a reproduction of the USGA’s “Environmental principles for golf courses” which they (and the 21 other organisations involved) envisage as a guide for making good environmental decisions based on good design, construction, maintenance and clean facility operations. The measures are referred to as a “tool” to help decision makers but involve considerable investment and change. So what are “practical” measures?

2.3 Research questions

It would appear that the USGA have taken “practical” to mean “right or sensible”. It therefore seems that “practical” means different things to different people.
"Practical" as an adjective relating to things, according to the Oxford Advanced Learners Dictionary (2005, p 1181) is defined as:

I. Likely to work (of an idea, a method or a course of action) right or sensible; likely to be successful SYN. workable:

II. Useful (of things) useful or suitable, a practical little car, ideal for the city.

However a “practical” little city car may not be suitable for driving in mountainous areas. It follows that “practical” may be context specific. Therefore in order to come up with “practical” measures for clubs the following questions must be answered: -

R1. How is a “practical” environmental measure defined?
R2. What factors make it “practical”?
R3. In which environmental categories (such as education and outreach, nature conservation) is it easiest to carry out measures? Which specific measures (grass cutting, habitat creation) are easiest?
R4. How does the context relate to the uptake of “practical” best practice?
Chapter 3 Methodology

3.1 Methods and techniques selected

The Delphi method

The Delphi method was selected to gather expert opinions on research questions R1-3 and to provide some information on R4.


“A systematic method of collecting opinions from a group of experts through a series of questionnaires, in which feedback on the groups distribution is provided between question rounds while preserving the anonymity of the respondent’s responses”

The technique of sending successive questionnaires encourages consensus, in that responses evolve with each round.

Content analysis, where key words are identified in responses, was chosen to summarise the Delphi replies. Which were subsequently analysed using Soft Systems Methodology (SSM), as described in Checkland and Scholes (1990).

Cross - sectional surveys

Cross - sectional surveys were used to provide further information on research question R2, R3 and to answer R4. The method, involved collecting data in a structured way from six clubs. The technique of semi-structured interviews, where a series of questions are asked in an informal way, was used as the procedure to collect information from people at the clubs. The information was analysed by content then SSM was used to interpret the factors and context (R2 & R4) behind the adoption or not of “practical” best practice.

3.2 Justification
Justification of The Delphi method

The Delphi Method allows experts time to consider issues in a reflective way. Garrod states the technique “allows the expert participants to address issues in a structured, deep and anonymous way”. It allows them time to reflect on complex issues, and to form some sort of agreement. Other consensus building methods described by Jackson were considered such as “Nominal Group Technique” and “Options Field Methodology” (Jackson, 2000, p 216-217). These were rejected due to the difficulty and cost of bringing experts together as a group (even in cyber-space) given their schedules and the time difference between Europe and America.

Garrod describes a two round Delphi process (rather than the normal three or more rounds) used by Bristol University to look at participant perspectives of what marine ecotourism meant. The study gained the required result, took less time and was easier to administer than a conventional Delphi method. It was felt, that it would be suitable in this context given the tight schedule and the similarity between the two situations (they both involved looking at contested complex environmental situations where definitions and hence direction were not clear)

Justification of the analytical method used for the Delphi data

Content analysis was selected, as this was the method that was successfully used by Garrod. Putting numerical values to key words or themes also provided a clear indication of expert preferences. Other forms of analysis were considered, particularly the use of statistics. This was rejected due to the fact that the data collected was qualitative rather than quantitative.

Soft Systems Methodology (SSM) was selected as a secondary analytical method as it enabled a “rich” picture (a drawing showing relationships and connections between factors) of the replies to be built up from which models could be generated. It could be argued that the methodology was used in a superficial way, after all it should follow the series of steps shown in figure 3.1 allowing issues to be explored, debated, negotiated and redrafted among stakeholders the process being iterative (Checkland and Scholes 1990, p25-28). This would hold if the research looked at using SSM to facilitate the introduction of measures at particular clubs. However in this case it was important to understand the process involved in making something “practical” or not. Moreover Checkland and Scholes also envisaged later that the technique could be used to “structure thinking” (p228). It is in this sense that SSM has been used.
Justification of the Cross-sectional survey method and techniques employed to gather data

Is a cross sectional survey valid? Would it not be possible to carry out an in depth case study of courses? This was considered but put aside due to the scale of the operation, the time it would take to process the information and the complexity of the issues. Local politics at courses could also have affected the research, particularly their fear of environmentalists. The less intrusive method of a cross sectional survey was opted for as being generally more acceptable to clubs.

How was the information to be gathered? The process of sending questionnaires to a number of clubs was considered. It would be fairly easy for them to tick boxes and the data could be analysed statistically. The idea was turned down due to the interrelated nature of problems arising around the adoption of environmental measures at clubs.

This led to the selection of the technique of carrying out semi-structured interviews. These facilitate participation by the interviewee, enabling participants to jump from topic to topic and to introduce subjects that they see as being relevant. The technique is also less time consuming as it is quicker for interviewees to talk than to write (an important factor given the time constraints of daily maintenance). It could be said that interviews at six clubs might be a shallow investigation, that
internal validity could be compromised by superintendents being selective in what they talked about and that comments could have been misinterpreted (Wetherall 1968, p.152-8). This does not hold as the method chosen was participatory and was based on a “transect”. That is interviews took place while an area was being traversed allowing observation and discussion of the measures being carried out (Johnson & Mayoux, 1998, p.152). Likewise the secretary manager interviews, to collect background information, were conducted in the club house. The location was useful as they were able to point to old pictures, portraits and lists of past champions to explain the clubs philosophy. Why were superintendents and secretaries chosen? These staff members were selected rather than other club staff as they are key elements in the decision making process, balancing the wishes of the “owners” (the golfers) with the need for competent and responsible environmental performance.

Are the clubs representative? The aim was to allow social, climatic and operational differences to come to the fore to see if they had any influence on the uptake of best practice. The criteria used in the clubs selection were:-

Social
- Clubs should not be close together (where this was unavoidable there was to be a stark difference between the cost of membership).
- Members should be different from different groups (tourists, country people and city dwellers).
- Clubs should be drawn from different cultural areas.

Climatic
- The clubs should be from different locations enjoying different climates and micro climates.
- The clubs should also be from different altitudes. Figure 3.2 shows the geographical distribution of clubs.

Operational
- Courses should be of different sizes (one should be only nine holes).
- Maintenance regimes should be different.
Figure 3.2
Map showing the geographical distribution of clubs

- Verona Golf Club
- Dueville
- Argenta
- Bologna Sanfermo
- Gradara
- Florence
- Casentino golf club
- Arezzo
- Assisi
- Orvietto
- La Querce Golf Club
- Rome
- Fioranello Golf Club
- Castelgondolfo Golf Club
- Cassino
- Minturno
- Naples
- Salerno
- Bari
- Riv Dei Tessali Golf Club
- Agira
- Catania
Justification of the observation method

Information given on best practice was checked later using observation and completing an environmental indicator sheet based on a system used by the United States Air Force Centre for Environmental Excellence (AFCEE/TDE, 2005). It has to be said that this technique could be described as subjective and it belongs more to the method of case study. In this situation though the practice allowed detailed verification of the information given in the interviews (viewed briefly during the transect). It also provided a snapshot of environmental performance.

Justification for the analytical method of the data gained from the survey

A Systems approach was selected due to the complexity of the problems and their interrelated nature. Different forms of analysis were looked at under the broad headings of functional, interpretive, emancipatory and post modern, as described by Jackson (2000). Interpretive approaches appeared to be most relevant to golf courses, with their emphasis on people rather than structure or organisation. Among the interpretive systems Seng’s “Soft Systems Thinking” was considered, particularly the tool of “scenario planning”. The methodology was later put aside as it appeared better suited to conventional business analysis rather than investigation of the social issues that arise in and around golf courses. Given that people and in particular golfer expectations appear to have the greatest effect on environmental performance (Sanchez Hernandez, 1998, p57). In this light Soft Systems Methodology was once again considered as being the most appropriate to make sense of the situation in that it looks at power relationships and can be used to conceptualise complex situations (Blackmore & Ison, 1998, p54).

3.2 Research Procedures

The procedure for carrying out the Delphi Method

A list of best practice was put together from the available literature. Articles, books and pamphlets were checked for any reference to making something “practical”. Statements were grouped into environmental categories and allocated a key word relating to the factor or factors that made the practice “practical” (such as fitting in, shared values, shared success). This list formed the basis of the Delphi questionnaire.
Nine experts were contacted by telephone or e-mail to ask them if they would be interested in taking part. E-mails were sent to all participants, together with the questionnaire as an attachment. Due to some panel members lack of available time and the pressing need to collect the data, three of the replies were received via telephone conversations, the others were received by e-mail. Content analysis was carried out. A feedback document was then prepared showing the range of responses including the panel members original answer and associated coding. The feedback document asked participants to think again about what they had said, and to either stick with answers (in which case they must justify their choice) or to modify their responses. Lastly they were asked if they agreed with the associated coding. Content analysis was then carried out on the second set of replies to get a snapshot of expert opinion. Table 3.1 shows details of the make up of the Delphi panel.

Table 3.1 Delphi panel members

<table>
<thead>
<tr>
<th>Profession</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Educationalist/Agronomist</td>
<td>Italy</td>
</tr>
<tr>
<td>B Agronomist/Advisor</td>
<td>America</td>
</tr>
<tr>
<td>C International Consultant</td>
<td>America</td>
</tr>
<tr>
<td>D Ecologist/Advisor</td>
<td>America</td>
</tr>
<tr>
<td>E Director/Agronomist</td>
<td>Britain</td>
</tr>
<tr>
<td>F Ecologist/Advisor</td>
<td>Britain</td>
</tr>
<tr>
<td>G International Consultant</td>
<td>Britain</td>
</tr>
<tr>
<td>H Agronomist/Policy maker</td>
<td>Scotland</td>
</tr>
<tr>
<td>I Ecologist/Policy maker</td>
<td>Scotland</td>
</tr>
</tbody>
</table>

The procedure for analysing the Delphi replies

Content analysis round one

- The text was split by theme into the appropriate definition set D1-4 to help answer the research questions R1-R4, using specially adapted analytical software, NUD-IST (non-numerical unstructured data indexing searching and theorising) QSR N6 Student software.
- Strings of text were then categorised and coded based on the presence of key words, to allow them to be grouped and assigned values.
- Values were grouped and added up to show panel preferences using spreadsheets.
Changes were coded and added to the data sets to show changes of opinion.

Soft Systems Methodology was used subsequently to build a richer picture of the experts opinions. CATWOE analysis was used to look at “transformation processes (T where an input is changed to an output) and to categorise comments under their various headings as shown in table 3.2:

Table 3.2 CATWOE analysis

| C | “customers” | the victims or beneficiaries of T |
| A | “actors” | those who would do T |
| T | “transformation process” | the conversion of input to output |
| W | “weltanschaunung” | the worldview which makes this T meaningful in context |
| O | “owner” | those who could stop T |
| E | “environnemental contraints” | elements outside the system which it takes as given |

Following the CATWOE analysis root definitions were looked at to express the “core purpose” of the transformation process (T) (Checkland & Scholes, 1990, p33-36).

Models were built up around the experts opinions of “practical” using an adaptation of the partial technique described by Checkland (1990, p 291) that is:-

- CATWOE analysis was carried out.
- A rich picture was built.
- Root definitions were formulated of transformation processes “T” using imperative verbs.
- Conceptual models were drawn up of the systems needed to allow “T” to go ahead.

The procedure for carrying out the Cross sectional survey

Superintendents and secretaries were contacted by telephone and interview dates were agreed. Interviews lasted an average of an hour and forty five minutes with the superintendents and twenty minutes for the secretaries. They took place over a six week period in May and June 2006.

Table 3.3 highlights the clubs that were selected giving details about each course.
Table 3.3 The clubs chosen

<table>
<thead>
<tr>
<th>Course name</th>
<th>Location</th>
<th>L. metres/holes</th>
<th>Altitude</th>
<th>Reason for choice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verona</td>
<td>Sommacampagna (Vr)</td>
<td>6054/18</td>
<td>59m</td>
<td>A club from the North with a wetter climate, it has gained international certification under the European “CTG” scheme.</td>
</tr>
<tr>
<td></td>
<td>Northern Italy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Casentino</td>
<td>Poppì (AR)</td>
<td>2775/9</td>
<td>486 m</td>
<td>A nine-hole course in a valley of a mountainous area close to the sanctuary of Saint Francis at La Verna. It has an undulating topography and occupies a small area. The club has signed up to “CTG”</td>
</tr>
<tr>
<td></td>
<td>Central Italy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Castelgandolfo</td>
<td>Castel Gandolfo (RM)</td>
<td>6025/18</td>
<td>200 m</td>
<td>This is a top “luxury course” built in the bowl of an extinct volcano. It has lakes and mature trees. The club has signed up to “CTG”.</td>
</tr>
<tr>
<td></td>
<td>Central/South Italy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fioranello</td>
<td>Via della Falcognana (RM)</td>
<td>6145/18</td>
<td>140 m</td>
<td>A medium sized course situated in an open pasture area and with an undulating terrain. The course has habitats that are suitable for wildlife. The club has signed up to “Committed to Green”.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>La Querca</td>
<td>Sutri (VT)</td>
<td>6462/18</td>
<td>300 m</td>
<td>This is the Italian National Academy of Golf. So the club has access to the latest materials and techniques. The course is situated in rural countryside and the club has signed up to “CTG”.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Riva dei Tessali</td>
<td>Castellanteta (TA)</td>
<td>5947/18</td>
<td>10 m</td>
<td>An established seaside course, built amongst dunes in an ecologically sensitive area. Not part of “Committed to Green”</td>
</tr>
</tbody>
</table>

Qualitative data was collected from each and processed using a universal approach as advocated by Kitchin and Tate (Kitchen & Tate, 2000, p229-253). The procedure was as follows: -

- A series of questions were prepared from the literature review and were grouped under themes relating to CTG headings. A mock interview was staged to test the questions.
- Semi structured interviews were conducted (using the Italian language) with superintendents and the secretaries at the six clubs, to make a total of twelve.
Duncan Thomas  
Personal identifier W3500159

- All the questions were asked (hence the length of time for the interviews) but in different order according to their location and presence on the course or not.
- All the interviews were recorded using a digital voice recorder (after requesting the interviewees permission).
- The interview recordings were played back, the text was simultaneously translated and written down together with notes made straight after the event.
- Meaning checks were carried on samples.
- The descriptive details were recorded and the situational context.
- The text was typed into separate word-processed files.
- Text units were categorised and coded using QSR N6 Student software.

The observation procedure

Shortly after the interview the course was traversed and an observation sheet was completed by ticking boxes that related to the evidence that an environmental best practice measures was or was not being carried out. The results were later keyed into the computer to give a total score which was then expressed as a percentage of the potential score.

The procedure for analysing and interpreting data gained from the surveys

Content analysis was first carried out, to ascertain and group the environmental measures that were being carried out under the CTG headings. Soft Systems Methodology, was then used to understand the factors and processes (R2).

Analysis using SSM involved the following steps:

- A “rich picture” was drawn of each club situation.
- CATWOE analysis of the clubs followed, identifying the roles of intervention, issues (problematic and non problematic) the people involved and the commodities of power.
- Measures that were being carried out were compared to the conceptual models formulated from the Delphi study to devise and understand the nature of “practical” environmental measures.
3.4 Ethical considerations

➢ All copyright constraints have been respected.
➢ All materials and ideas have been acknowledged.
➢ Anonymity is guaranteed for the Delphi study.
➢ Candidates were asked if they agreed with codes allocated to text.
➢ Informed consent was sought for all interviewees.
➢ Interviews followed the same pattern.
➢ Interviews were carried out in a clear and transparent manner.
➢ Permission was gained to digitally record the interviews.
➢ Meaning checks were carried out to ensure accuracy regarding the gist of interviews.
A summary of the research methods (shaded in yellow and blue), techniques, procedures and analysis (in grey) is shown in figure 3.3.

Figure 3.3 A summary of the research

**Cross Sectional Method**
- Technique, semi-structured interviews with superintendents at six clubs.
- Collection of data to throw light on research questions:
  - R2 What makes an environmental measure practical?
  - R3 Where is it easiest to carry out measures?
  - R4 Contextual effects?

**Delphi Method**
- Technique, questionnaires sent to nine experts on two occasions to elicit expert opinion on:
  - R3 The category of environmental measure under where it is easiest to make changes?
  - R4 Contextual effects?
  - R2 What factors make an environmental measure practical?
  - R1 How is practical defined?

**Steps:**
- Verify by observance
- Data transcribed and coded into decision & environmental categories
- Measures grouped per category
- List of best environmental practices adopted per club
- Triangulate against list produced from the literature review
- SSM analysis of clubs including CATWOE, norms, values & power analysis
- What is being carried out and why?
- Produce list of "practical" measures from those that fit model S1, include S1 measures from the literature review.
- Content analysis carried out then analysis using Soft Systems Methodology. Models drawn from the transformation process, using CATWOE analysis
- Check models against situation in the real world