GREENING GOLF COURSES TO AVOID ALGAL BLUES

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As one of the most polluted recreational waterways in NSW, Manly Lagoon suffers from nutrient overload. One of the major recommendations of the Manly Lagoon Estuary Management Study is to implement best environmental practices at the golf courses, bowling greens and myriad playing fields through the catchment.

The Manly Lagoon Estuary management Committee has resolved that an environmental management strategy be designed for all four golf courses in the lagoon catchment - Balgowlah, Warringah, Manly and Wakehurst - in conjunction with the Australian Turf grass Research Institute, Council staff and the Manly Environment Centre.

A unique research project with environmental science students and staff of the University of NSW was set up on the environmental economics of the golf clubs and open space management in this catchment. The project involved primarily an investigation of the economic aspects of golf course management and the ecologically efficient use of a common resource by competing interests.

Manly Lagoon is a small coastal lagoon situated at the boundary of Warringah and Manly Councils in Sydney's Northern Beaches. It has a catchment area of 18 square kilometres. Inflows to the lagoon include Manly Creek, Burnt Bridge Creek and Brookvale Creek and additionally a large number of storm water drains.

Sydney Water has 29 sewer overflows in the catchment, the greatest number for any waterway in their area of responsibility when considered in terms of waterway size.

The Manly Lagoon Estuary Management Study (1995) states: "The water of the lagoon is eutrophic (oxygen depleted) and sensitive to further increases in nutrient inputs ... Manly Lagoon sediment is contaminated with heavy metals and, compared with Sydney Harbour or Curl Curl Lagoon, has the highest average levels of copper and lead ... Indigenous vegetation is severely depleted... as such, any areas of remnant vegetation should be maintained and conserved as a valuable resource."

The Manly Lagoon Study indentified potential sources of pollution as being from a number of industrial estates, Warringah Mall shopping centre, residences and golf courses and playing fields. These sources are being addressed by various strategies; ie, Sydney Water has allocated

approx $20 million to rehabilitate their infrastructure, and manly and Warringah councils are conducting education programs for residents and industry audits.

STUDENT PROJECT RESEARCH TOPIC ENVIRONMENTAL ECONOMICS OF GOLF CLUBS AND OPEN SPACE MANAGEMENT IN THE MANLY LAGOON CATCHMENT

1. Preamble:

The Manly Lagoon Estuary Management Committee has resolved that an environmental management strategy be designed for all four golf courses, in conjunction with the Australian Turfgrass Research Institute, council staff from Manly and Warringah Councils and the MEC.

The Australian Turfgrass Research Institute has been funded to devise an environmental management strategy for golf courses and water quality monitoring. The Institute is conducting a high profile conference on the 4th and 5th March 1996 on these issues and the published papers will set future directions.

The Manly Hydraulics Laboratory has recognised the value of the total catchment management approach by installing continuous water quality monitoring at dam and the lagoon entrance with a modem linkup to the MEC.

Each golf course has different demands on the catchment which will be reflected in the management plan.

Manly is in the flood plain and uses bore water.

Balgowlah has a dam and tanks on the low flow Burnt Bridge Creek which is contaminated by sewer overflows.

Warringah suffers the impacts of major industrial and litter pollution.

Wakehurst, following an outbreak of blue-green algae in Manly Dam in 1992, was directed to avoid fertiliser use and successfully adopted other practices. However, Warringah Council issued consents for land-filling operations since 1970 to Wakehurst Golf Club. As a result of community concern about alleged leachate from the landfill, the Club in conjunction with the Environmental Protection Authority and the Australian Analytical Laboratories have conducted tests which indicate "there is cause for concern." In some areas the levels of Calcium Potassium, Iron, Ammonia and Phenolic compounds are many times the acceptable level. Tipping has now ceased.

2. AN OVERVIEW: THE ANALYTICAL FRAMEWORK;

The project primarily involves an investigation of the economic aspects of golf course management and the ecologically efficient use of a common resource, water by competing interests.

The analytical framework involves economic tools of analysis to identify and articulate the interests of competing use. These competing users bring together intersecting sets of community values, golf club member values and environmental values that in some cases conflict and in others overlap and reinforce each other. The objective is to identify areas of mutual benefit in order to resolve those areas of conflict, as well as to ensure long term sustainable use of scarce resources.

It is relatively easy to identify and articulate in monetary terms the interests of the golf club as a commercial enterprise, serving the mutual interests of its members. It is less easy in the case of the community and the environment. Economic tools help here despite some quite severe limitations.

3. BENEFIT COST ANALYSIS;

Benefit-cost analysis seeks to identify who receives the main benefits and who bears the burden of the main costs. A very successful scheme is expected to be profitable for all parties. However, even if the scheme were unprofitable from the point of view of one party, it may still be beneficial from the point of view of community. A benefit cost analysis may highlight community gains over and above private benefits and costs. In this type of analysis what is a benefit to one party may be cost to another.

3.1 Recreational value of golf course.

3.2 Recreational value of Manly Lagoon, Manly Dam and catchment area.

3.3 Value of water quality

3.4 Value of biodiversity in the Manly lagoon, Manly Dam and Catchment Area

4. LEGAL FRAMEWORK

4.1 Any environmental project must be assessed in terms of the legal framework: federal, state and local government. Strategies must adhere to minimum standards, guidelines, goals and associated protocols.

4.2 Regulatory strategies need economic incentives if they are to be successfully implemented in a profit driven competitive market. In some instances market based schemes have the potential to be efficient both ecologically and economically. In other instances regulation may be deemed more appropriate. An assessment is required of which aspects of the scheme can be market driven and which aspects would require regulation.

5. ANALYSIS OF OPTIONS AFFECTING THE COMPETING INTERESTS

An assessment needs to be made of the options available to deal with particular problems where there are competing interests. The following areas may well require special attention:

5.1 Biodiversity
5.2 Chemical Use
5.3 Water quality
5.4 Water Conservation
5.5 Legal Framework
5.6 Competing Interests and Attitudes of Members and Players

REPORTS BY THE STUDENTS PARTICIPATING IN THE RESEARCH PROJECT

In the initial stages, the students formed into six research teams. They visited all the golf courses to interview staff and gather information as well as visiting other sites and gaining personal assistance from other experts. They have produced a combined document which is held at the MEC. It consists of 130 pages and a bibliography over 70 references from many different sources both local and overseas. The report is titled University of NSW Student Research Project Environmental Economics of Golf Course and Open Space Management in the Manly Lagoon Catchment.

The following is a very brief summary of their findings:

BIODIVERSITY

In both Europe and the United States, golf courses have received the attention of the environmental movement. In The United States golfing and environmental interests have combined to help minimise the effect of golf courses on biodiversity and often assist each other in the promotion of biodiversity. Of particular note is the co-operative effort of The United States Golf Association and the Audubon Society of New York State. The Audubon Society promotes the conservation of wildlife, and as such recognizes the important part golf courses play in the provision of habitat. To this end the Audubon Co-operative Sanctuary Program has been instituted with its stated agenda to: -

- Educate the public and golfing community on the benefits of golf courses and the role they play relative to the environment and wildlife.
- Encourage active participation in conservation programs by golfers, golf course superintendents, golf officials and the general public.
- Recognise the golf courses as important open spaces and credit the people actively participating in environmentally responsible projects.
- Enhance wildlife habitats on existing and future golf courses by working with the golf course manager and providing advice for ecologically sound golf course management.

Almost 2000 courses have joined the program in the U.S.A. and Canada and receive accreditation for: -

- Environmental Planning
- Public/Member Involvement
- Wildlife and Habitat Management
- Integrated Pest Management
- Water Conservation
- Water Quality Management

Preliminary research in the Manly Lagoon Catchment indicates an amazing biodiversity for an urban catchment so close to a major international city. Wakehurst Golf Club is part of the Manly Warringah War Memorial Park (also known as Manly Dam Reserve). The species list includes:

- species of flora (2 species listed as rare and threatened (3 species have conservation significance, 4 locally restricted plants and an unusual orchid.)
- bird species
- native mammals
- 15 reptile species
- frog species
- species of crustaceans

In attempting to find the balance between economic prosperity and successful maintenance of biodiversity, we suggest the following approaches: -

- the precautionary principle be adopted as best management practice on any issue that may affect the biodiversity of the golf course and its surrounding area.
- the adoption and sponsorship of one of the neighbouring endangered species as a focus for both employees and players to develop pride in the environmental practices of the club. Media and advertising attention on the club could then emphasise the exotic nature of the surroundings. This can be highlighted by promoting the club as environmentally concerned, situated in an area of high natural beauty and the home of certain endangered species.
- the enlistment of local environmental nature and community groups to help provide some of the expertise and labour essential to the success of these initiatives.

CHEMICAL USE

Information from the Environment Protection Authority (EPA) indicates that golf courses can contribute nutrient-rich runoff based on studies done by Professor Cheng of the University of Technology, Sydney.

EPA Staff from the Outer Sydney Region are frequently called out to inspect fish and duck kills on golf course dams. These events are likely to have been caused by the misapplication of

insecticide and algaecides by golf course staff, although this has been difficult to prove conclusively.

EPA Staff have also identified blue-green algae in watercourses and dams immediately downstream of golf courses. On at least one occasion recently, the EPA issued a section 17 notice requiring a golf course and country club to monitor Total N and Total P in the dams on its course. The local newspaper reported the event as "EPA takes a chip at local golf club"!

The National Registration Authority in conjunction with Rhone Polenc and Chemspray has produced an attractive publication titled "Turf Stewardship". The following quote from it highlights their concern: "Times are changing for the turf industry. Turf professionals must take action and educate others including committees, management, staff, industry officials, turf users and our community about the issues and what we are doing as stewards of the environment. It is our duty."

Workcover NSW has produced a 100 page safety guide in association with the Registered Clubs Association of NSW and the NSW Golf Courses Superintendents Association. "Health and Safety at Work-Greens, Garden and Grounds...gives simple advice on tough issues such as working safely with chemicals." 22% of grounds maintenance staff worry about working with chemicals and this publication will help grounds management staff tackle the health and safety issue.

Research has identified programs to reduce the impact of fertilizers which can be incorporated into Best Environmental Practice for golf courses. (Peacock and Smart 1995).

Pesticides used on courses include herbicides, fungicides, growth regulators, defoliants, desiccants and insecticides. A program called Integrated Pest Management (IPM) has been developed specifically to aid in the regulation of pests without harming the environment. IPM is a multi-disciplinary, ecologically-based pest management system that uses all available methods to keep pests at acceptable levels while minimising the effect on people, the environment and the golf course. A sound IPM program is based on the acceptance and tolerance of pests at a damage level which does not significantly reduce the acceptability of the turf (Bowman 1995).

Pesticides are necessary to keep pests at tolerable levels and could well continue to be an integral part of IPM programs. However, sole reliance on chemical control can no longer be justified because of rising chemical costs, increased resistance to pesticides and environmental and health concerns.

World Watch reported that a survey of Japanese doctors in 1991 showed that of some 500 patients "with suspected poisoning from agricultural chemicals, 125 were associated with golf courses, 97 as employees". The U.S National Association of Golf Superintendents funded research on the links between long term pesticide exposure and cancer which showed a higher mortality rate among golf course workers.

A survey of chemical use of the four golf courses indicated that amounts of chemicals used and their impacts are not well documented. Whilst an American case study at Tampa Palms Club

showed saving of $26,000 per annum were possible, (Miller and Parkes) there was insufficient data available from the four local courses studied to complete a cost benefit analysis.

WATER QUALITY

Manly Dam is an important recreational water body. Ongoing monitoring of the dam's water quality includes weekly algae counts and monthly chemical analysis.

Leachate from tip sites on the golf course is considered to be a possible source of contamination of the dam. The Golf Course is only one of several possible sources of pollution.

A comprehensive testing/monitoring strategy is needed in order to identify the source of pollutants and to enable effective allocation of resources.

Buffer zones are needed on all courses to protect water quality.

The Australian Golf Union and Society of Australia Golf Course Architects have produced a attractive publication "Golf Courses...Benefits to the Community and Environment". This states that "well designed golf courses protect water resources...golf courses play a significant role in the management of water, aiding the conservation and preservation of water resources. Golf courses act as a natural filter of stormwater and run off. Turfgrass, together with the natural landscape, function in trapping sediment and pollutants before they enter common waterways. The containment of water on site helps in flood control and filtration whilst contributing to the recharge of aquifers and groundwater which may otherwise pollute nearby waterways."

The Australian Turf Research Institute is initiating a water quality monitoring program for golf courses.

WATER CONSERVATION

Australia is a very dry continent, making water a scarce resource which needs to be conserved. Golf courses and their surrounding environment are interrelated. The runoff from courses by excess water use and inefficient collection of water, can adversely affect the catchment area. Fertilisers and chemicals can leach into surrounding environment and damage the native flora and fauna and encourage the spread of weeds. Thus water conservation is an ecological advantage.

The main water conservation options available for golf courses vary from reducing the need for water to preserving any water that falls on site. They include: -

- testing irrigation equipment for accuracy
- irrigating with effluent
- growing plants with more appropriate water needs
- replacing the existing turf with more water efficient species
- varying the amount and time water is applied.

None of the four courses in this study use drinking water. They use bore water, water drawn from the local creek and Manly Dam. There are no records kept of the amount of water used.

The courses have been built on sandy soils which have low water retention rates and turf grass most used is kikuyu that may require a lot of water. Generally all three courses water three times a week during summer, for between 20 to 40 minutes.

Research in this area located interesting case studies both locally and overseas. Treated effluent has been successfully used reducing costs of fertilizer. At Camden Lakeside Country Club the course was designed and constructed to utilise available water. To do this the club integrated the use of water storage, wetlands and waste water. Waste water is reused in irrigation; the waste is treated in an aerated waste-water management system and then spends time in a settlement pond before it is reused.

LEGAL FRAMEWORK

As Graham McKee's workshop at this conference will deal more fully with potential problems, this section has been abridged.

The preliminary findings of this very comprehensive study were that there are number of legal implications for the four golf courses studied.

Our environmental law involves 4 main principles: -

- the precautionary principle
- intergenerational equity
- conservation of biodiversity and ecological integrity
- effective economic evaluation of the environment

Poor environmental management involves a number of economic/legal costs, through the idea that the "polluter pays", and possible employee health and safety issues covered by workplace laws. Corporations and directors or managers, are responsible for any actions of their employees. The best legal defense of any corporation is "due diligence".

COMPETING INTERESTS AND ATTITUDE OF MEMBERS AND PLAYERS

Cleaner production issues apply to golf courses just as much as industry. In his presentation to the NSW EPA, international expert on Cleaner Production, Professor Don Huisingh showed that:

- 65% of cleaner production problems can be eliminated by improving attitudes and housekeeping

- 30% of these changes can be implemented at no cost within 3 years.

The Audubon Co-operative Sanctuary Program has long recognised the essential need to change the attitudes of members and players and has prepared some excellent publications, posters,

videos and programs for this purpose. The theme of these materials is "golf courses benefit people and wildlife" ie. co-operation not confrontation.

As part of this project it was decided to survey the attitudes of members and players to adopting the best environmental practice regimes being introduced in Europe and the USA. A highly visual and informative "polling booth" display using the Audubon materials was set up in all four clubhouses to enable members and players to complete these surveys.

This first ever members survey attracted a lot of media attention in two local papers and a page in the Sydney Morning Herald.

Preliminary results indicate overwhelming support by members and players for best environmental management of their golf courses. It is also obvious that there is little understanding by members and players of the potential impact of golf courses on the environment.

CONCLUSION

In his paper presented at the Australian Turf Research Institute's Conference this year, David Stubbs, from the European Golf Association Ecology Unit concluded an Environmental Action Plan for Golf.

Two important elements of this plan are the establishment of an information clearing house and an education awareness program. The information detailed in the reports from the University of New South Wales Research (outline above) provides the golf courses in the Manly Lagoon Catchment with such an "information clearing house" and the basis for an "education and awareness program".

The students work outlined in this paper has shown there are many data gaps and has highlighted the need for research in many areas. The University has agreed to continue their valuable support with ongoing student research projects and involvement.

Formulating the first Catchment Plan for Environmental Management of Golf Courses is a challenging task which has been taken up with great enthusiasm by experts in many fields, from within and without the catchment.

A number of meetings have been held with the four golf courses. They have each been provided with a resource folder on the many aspects of environmental management of golf courses. The ongoing support of these experts, including ATRI staff, has been essential in these early stages.

Lawyer Graham McKee and I have drafted a draft Strategic Environmental Plan for the clubs to take to their management for endorsement.

Liz Newton, an expert in Occupational Health & Safety is providing valuable material to link health and environmental issues in the management plan.

Robert Ashes from the Australian Golf Courses hosted a demonstration of his chemical wash-down facility to our group.

Wakehurst has what we might call a biodiversity support group which has listed their flora and fauna and looked at habitat enhancement. They have offered assistance, as have other local conservation groups. Greening Australia has also expressed an interest in assisting in planting projects.

The Petrik Soil Program has produced some excellent results at Palm Meadows Greens in Queensland and it is anticipated that the company will give a presentation to the golf courses on their methods which reduce the use of chemicals, without compromising turf quality. (Petrik 1996).

Local Streamwatch groups from Stella Maris, Mackellar and Seaforth TAFE and the Manly Environment Centre will assist with water quality monitoring.

REFERENCE

Audubon Society of New York: "Principles for Sustainable Resource Management"; "Audubon Cooperative Sanctuary Program for Golf Courses"; "The Audubon Cooperative Sanctuary System -Certified Signature Status"; "The Audubon Cooperative Sanctuary System-Guidelines for Certification"

Beehag, Gary..."Implementation of a Pollutant Monitoring Program". Proceedings for Environmental Issues for Turf...A symposium 1996

Cheng, D. "Manly Dam Catchment Water Quality Study" 1993 Department of Land and Water Conservation "Buffer Zones along Rivers and Creek" Riverwise. EPA communication of 29 August 1995

Figgis, PJ "Coming Up to Par - Green Guidelines for Golf"...Proceedings of Environmental Issues for Turf: A symposium, 1996

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Miller and Parkes;, "Golf and the Environment" Urban Land August 1995

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Patterson Britton & Partners: Manly Lagoon Estuary Management Study"

Peacock, C. and Smart, M. "IPM, Monitoring and Management plans - A Mandate for the Future", USGA Green Section Record May June 1995

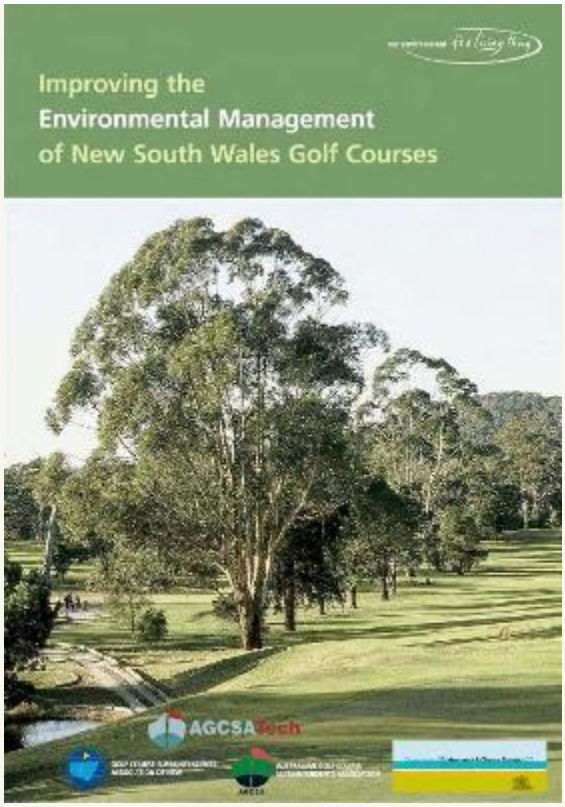
Petrik Aust. "An Overview of the Petrik Soil Program" and "Notes of Palm Meadows Greens"

Society of Australian golf Course Architects and Australian Golf Union "Golf Courses Benefits to the Community and Environment"

NOTE:

The NSW EPA conducted several training courses, including one at Manly Council for the golf courses in the Manly Lagoon Catchment. The objective of these workshops was to assist golf course management to prepare their individual Environmental Management Plans.

Improving the Environmental Management of New South Wales Golf Courses



Improving the Environmental Management of New South Wales Golf Courses

Improving the environmental management of New South Wales golf courses

This educational manual is designed to provide golf course superintendents with valuable information on how to improve the environmental performance of golf courses. While the focus of the manual is on

environmental compliance, thereby reducing risks and avoiding penalties, the manual will also help golf courses operate more efficiently and so save resources.

Improving the Environmental Management of New South Wales Golf Courses covers a range of environmental issues facing golf courses, with a particular emphasis on issues such as water use and re-use, pesticides and fertiliser practices, grass selection and soil management, machinery management and maintenance facility management. It also looks at the management of club houses as well as native vegetation and wildlife management.

The manual provides practical advice as well as a range of useful worksheets and checklists for managing aspects of environmental management. Also included are links to useful sites and contacts, however all users are recommended to check the relevant agencies for updated legislation and resources.

Download full document

- **Improving the Environmental Management of New South Wales Golf Courses** 07588GolfCourses.pdf (April 2008, PDF 1842kb)

Download sections

- **Section 1: The Environmental Principles for Golf Courses** (07588GolfCoursesPt1.pdf, 241KB)
- **Section 2: Water Management** (07588GolfCoursesPt2.pdf, 310KB)
- **Section 3: Integrated Pest Management** (07588GolfCoursesPt3.pdf, 79KB)
- **Section 4: Pesticide Storage, Handling and Application** (07588GolfCoursesPt4.pdf, 121KB)
- **Section 5: Fertiliser Practices** (07588GolfCoursesPt5.pdf, 80KB)
- **Section 6: Grass Selection** (07588GolfCoursesPt6.pdf, 84KB)
- **Section 7: Soil Management** (07588GolfCoursesPt7.pdf, 116KB)
- **Section 8: Native Vegetation and Wetlands** (07588GolfCoursesPt8.pdf, 358KB)
- **Section 9: Clubhouse and Facility Management** (07588GolfCoursesPt9.pdf, 62KB)
- **Section 10: Machinery Operations** (07588GolfCoursesPt10.pdf, 84KB)
- **Section 11: Education and Training and Glossary** (07588GolfCoursesPt11.pdf, 452KB)