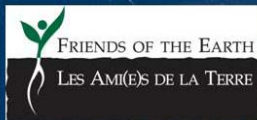




Freshwater: A Study of Golf Courses in Canada

Author
Alina Michalska, 2005



WATER SOFT PATH PROJECT
LED BY
FRIENDS OF THE EARTH CANADA

TABLE OF CONTENTS

Introduction..... 1
Water..... 1
Water Quality¹ 1
Water Quantity..... 2
Certification 2
Principles 3
Conclusion 4
Appendix A: Alberta..... 5
Appendix B: Ontario..... 5
Appendix C: Nova Scotia 5
Appendix D: Certified Audubon Cooperative Sanctuaries In Canada 6
Appendix E: Water Goals From The Environmental Institute For Golf Task Group 7
Appendix F: Overview Of 2,4-D 8
References..... 9

INTRODUCTION

Luscious greenery and open spaces are just a few images that go hand in hand with golf courses. In an increasingly urban world these are highly valued intangibles. However, there are real environmental concerns related to potential and actual impacts of irrigation, pesticide, herbicide and fungicide applications, and destruction of wetlands and other habitats due to golf courses. As interest in the game rises, and more golf courses are built, the need for water conservation and protection is also rising.

WATER

The Environmental Institute for Golf is an organization working towards strengthening the relations between the game of golf and the natural environment. It has identified legislation, water quality and quantity, and economic impacts as main issues of water use in golf courses.

1) Legislative and Regulatory: negative public perception; lack of baseline data on water use; variable water law and regulations; drought restrictions can be imposed without regard for damage to golf properties.

2) Quantity and Quality: future water availability; water use and distribution efficiency can vary between golf properties; elevated soil salinization on courses using effluent/reclaimed water: implications of aquifer drawdown to golf courses: protection of cold water streams: impact of river flow on golf course water use.

3) Economic Impacts: lack of information on water costs across golf industry; high costs for water in many areas; drought restrictions are able to seriously damage golf properties: water restrictions affect tourism; high cost of infrastructure to utilize effluent/reclaimed water.

(EIFG, 2004).

WATER QUALITY¹

There are several water quality issues that pertain to golf courses: groundwater, salt, stormwater management and surface water (EIFG, 2005). Groundwater can be contaminated through pesticides and nutrients, petroleum, and thermal manipulation. Wellhead protection and calculation of groundwater recharge value studies are two key measures that should be in place on golf courses.

Surface waters such as ponds, lakes, streams and wetlands should be adequately protected by golf courses. Regulations regarding water withdrawals should be in place and enforced, and both volume and quality of surrounding bodies of water should be continuously monitored. Similarly, pesticides, nutrients, petroleum, soil and thermal manipulation can negatively affect surface water. Aquatic vegetation and wildlife should also be monitored.

Golf courses should look at treating and using storm water, which includes looking at nutrient levels in the water and soil contamination.

¹ The Canadian DWLOC (Drinking water levels of comparison) is "the maximum concentration in drinking water which, when considered together with all other sources of exposure, does not exceed a level of concern." (2,4-dichlorophenoxy) acetic Acid [2,4-D] acute and chronic DWLOCs are >2077 and 23 g/L respectively (PMRA, 2005).

It is difficult to find actual quantities of pesticide applied to golf courses. According to Environment Canada approximately 76500 litres of pesticides are applied to Manitoba golf courses each year (EC). 18 lb of pesticides per treated acres per year versus less than 3 lb per treated acre per year in agricultural applications.

WATER QUANTITY

An Environment Canada survey of freshwater use throughout the 1990s shows that municipalities are less and less likely to restrict specific users such as golf courses. (Municipalities in Ontario have used by-laws to impose water restrictions, usually with respect to watering lawns and washing cars.)

No sources of data on water use per hectare or other measure were found. They seem to be a well-kept secret, most likely because use rates are so high.

Soil

Most golf associations support turfgrass research.

Future Studies

River operations and how water withdrawals affect river flow should be studied more closely.

CERTIFICATION

Audubon International (AI) introduced the Audubon Cooperative Sanctuary Program for golf courses into Canada in the mid 1990s. It now boasts over 2300 certified courses around the world, including 52 in Canada. Unfortunately, after just over six years, Audubon International has decided that the growth has not met their expectations (their initial goal was to have 50% of all golf courses on board by 2007). The Canadian program is now managed by AI in their New York office.

The ACSP was created to help golf courses develop a plan under six criteria to fit their individual needs. Though this figure is nowhere near being realized, it is still important to have a program like this operating to distinguish golf courses that make environmental concerns a priority. Reduction of water consumption and chemical applications, and ongoing support in environmental projects are only a few of the benefits of this program (Audubon, 1996).

In order to become fully certified (as a "Certified Audubon Cooperative Sanctuary"), member golf courses must properly plan, implement and document their efforts in these six categories:

1. Environmental Planning
2. Wildlife and Habitat Management
3. Chemical Use Reduction and Safety
4. Water Conservation
5. Water Quality Management
6. Outreach and Education

Specifically, under the Audubon guidelines water conservation includes maximizing irrigation efficiency through proper timing, recapturing and re-use of water, reducing amount of land irrigated, using drought tolerant species and mulches. Aerification, wetting agents and thatch reduction (through aerification) also help in reducing water consumption. Aerification, the mechanical process of removing usually half-inch cores of soil, relieves soil compaction, improves the soil mixture around the highest part of a green's roots (allowing deeper roots) and it reduces or prevents the accumulation of excess thatch. Thatch is the layer of organic matter on the surface of turf (it can consist of dead stems, leaves and roots). Insects and disease go hand in hand with too much thatch, which leads to both chemical use and re-sodding (excess water use).

Water quality management includes Best Management Practices to reduce or eliminate nutrient loading, minimize water quality problems, and pond, stream and wetland management and monitoring.

PRINCIPLES

The Environmental Principles for Golf Courses in the United States were developed through a collaborative research and dialogue process between leading golf and environmental organizations, managed and facilitated by the Center for Resource Management, and published in March 1962.² Friends of the Earth (FoE-US) participated in the process, as well as the Royal Canadian Golf Association.³ These principles are voluntary and designed to provide guidance for golf courses to go beyond the letter of the law: they provide more of a 'good golf philosophy' rather than strict guidelines. Economic feasibility is emphasized throughout.

There are two main sections in the Principles that deal directly with water: Design and Maintenance (Water Usage).

Design:

Emphasis should be placed on irrigation, drainage and retention system design to "provide for efficient use of water and the protection of water quality." Water reuse strategies, including effluent irrigation systems, should be used for irrigation whenever possible. At times this may not be so; e.g. if the water drains into certain wetlands or sensitive surface waters. Creation of buffer zones between golf courses and neighbouring surface water or environmentally sensitive areas should either be maintained or created.

Water Usage:

There are several ways in which golf courses can reduce their water usage. Native, naturalized and specialized drought-tolerant plants should be used whenever possible. Irrigations patterns should be designed to meet the needs of the plants, minimize overwatering and evaporation, and reduce potential for disease.

The RCGA also has its own guiding principles. Construction near water courses, especially during fish spawning season, should be avoided; however, if this is not possible, unique wetland qualities and other sensitive natural areas are to be respected, and these areas should be incorporated as features rather than disturbed by golf course construction. Adequate water supply for both potable and irrigation needs of the

² The Center for Resource Management has a current list of endorsing organizations (801.466.3600)

³ The Environmental Principles for Golf Courses in the United States can be found in their entirety at <http://www.gcsaa.org/resources/facts/principles.asp>

golf facility and neighboring properties is important; plants best suited to the local environment and which need minimum water input should be used.

Irrigation should be designed to use water efficiently, and only when necessary. Alternative or supplemental sources of irrigation water should be investigated; this includes on-site storage from storm water run-off (perhaps on soils with low infiltration rates) or effluent. The RCGA suggests a 10m vegetative buffer zone adjacent to bodies of water to assist in filtering nutrients or pesticides from storm water run-off, and to moderate water temperatures. Supplementary planting of vegetation and retention of as much natural cover as possible to provide some wildlife habitat and support fish habitat along waterways.

The RCGA also suggests that after construction, native groundcover and under-storey species should be protected or re-established. The ground should be protected during construction through the use of mulching material, hydro-seeding or sod, and most importantly groundwater monitoring before and after construction is essential.

CONCLUSION

The impact of over 2000 golf courses in Canada is not negligible. A holistic management approach from beginning to end, including sound design, Integrated Pest Management, innovation, vegetative buffers, monitoring and baseline testing, is necessary to reduce the impact golf courses have on surrounding freshwater resources. With the Audubon certification program and guiding principles set out by many golf associations, golf courses have the opportunity to be considered a model of water efficiency.

APPENDIX A: ALBERTA

The City of Calgary and the upcoming Blue Devil Golf Course are using a pilot treated effluent project to supply irrigation water for the golf course. The treated effluent (disinfected water discharged from a wastewater treatment plant) will be filtered, treated with chlorine, and stored in a holding pond. Effluent reuse is not too common in Alberta, but is becoming more widespread as water prices increase and water becomes more scarce in dry summer months.

APPENDIX B: ONTARIO

There are over 600 well-used golf courses in Ontario, most of them on the urban fringe — within an hour's drive from town or city (Green Ontario). In a 2003 study of the Long Point region, golf course irrigation accounted for 27% of commercial water use (Dryden-Cripton, 2005).

The major golf course associations in Ontario are the Royal Canadian Golf Association (RCGA), the Ontario Golf Association (OGA), the Ontario Ladies Golf Association (OLGA) and the Ontario Golf Superintendents Association (OGSA).

Though the RCGA collaborated on the Environmental Principles for Golf Courses in the United States, it tends to follow a less progressive approach as outlined in its Green section. The RCGA also funds turfgrass research through the Guelph Turfgrass Institute to develop turfgrass that needs less water and chemicals.

APPENDIX C: NOVA SCOTIA

Under the Environment Act, the Activities Designation Regulations (Division I) require a water withdrawal approval ("Water Approval") if a surface or groundwater withdrawal exceeds 23000 litres per day. Completed application form and supporting documentation are sent to Nova Scotia Environment and Labour (NSEL) for evaluation.

APPENDIX D: CERTIFIED AUDUBON COOPERATIVE SANCTUARIES IN CANADA

(List is current as of 25 May 2005.)

Alberta

Banff Springs Golf Course, Banff
Calgary Golf and Country Club, Calgary
Fairmont Jasper Park Lodge Golf Course, Jasper
Goodman, McDougall & Associates, "The Learning
Sanctuary", Millarville
Highwood Golf & Country Club, High River
Innisfail Golf Club, Innisfail [Audubon Certified]
Lethbridge Country Club, Lethbridge
Priddis Greens Golf and Country Club, Priddis [Audubon Certified]
Stewart Creek Golf & Country Club, Canmore

British Columbia

Chateau Whistler Golf Resort, Whistler
Cordova Bay Golf Course, Victoria
Fraserview Golf Course, Vancouver
Langara Golf Course, Vancouver
McCleery Golf Course, Vancouver
Point Grey Golf and Country Club, Vancouver

Nova Scotia

Glen Arbour Golf Club, Hammonds Plains
Highlands Links Golf Course, Ingonish

Ontario

Blue Springs Golf Club, Acton
Camelot Golf & Country Club, Cumberland
Circled Pine Golf Course, Borden
Cranberry Resort Golf Course, Collingwood
Diamond Back Golf Club, Richmond Hill
Donalda Club, Don Mills
Glen Abbey Golf Club, Oakville
Granite Golf Club, Stouffville
Hamilton Golf and Country Club, Ancaster
King's Riding Golf Club, King City
Markham Green Golf Club, Markham
Monterra Golf at Blue Mountain Resort, Collingwood
Nobleton Lakes Golf Club, Nobleton
Oakdale Golf and Country Club, Downsview
Peel Village Golf Club, Brampton
Rattlesnake Point Golf Course, Milton
Rocky Crest Golf Club, Mactier
Saw Mill Golf Course, Fenwick
St. Thomas Golf & Country Club, St. Thomas
Station Creek Golf Club, Gormley
Stone Tree Golf & Fitness Club, Owen Sound
The Lake Joseph Club, Port Carling

The Toronto Board of Trade Country Club, Woodbridge
Thornhill Country Club, Thornhill
Whitevale Golf Course, Whitevale
Woodlands Links, Clinton

Quebec

Beaconsfield Golf Club, Pointe-Claire
Cedarbrook Golf & Country Club, Mirabel
Club de Golf Lac Brome, Ville de Lac Brome
Hillsdale Golf & Country Club, Mirabel
Le Challenger Golf Club, Saint-Laurent
Le Chateau Montebello, Montebello
Royal Montreal Golf Club, He Bizard
Summerlea Golf and Country Club, Vaudreuil-Dorion

APPENDIX E: WATER GOALS FROM THE ENVIRONMENTAL INSTITUTE FOR GOLF TASK GROUP

Primary water quality goals

- Minimize impact of golf courses on water quality
- Maximize the protection of water resources on golf course properties
- Develop / promote use of assessment tools to qualify water resources on golf properties
- Promote the use of water quality management plans on golf courses
- Promote research/education on costs vs. benefits for water protection practices
- Position golf course properties as an environmental asset to the community

Primary water use goals

- Maximize water use efficiency
- Minimize impacts on water supplies
- Promote research on lower water use turf
- Collect water use information on golf properties regarding
 - Irrigation systems
 - Utilization of ET in decision-making
 - Use of weather stations
 - Effluent/reclaimed water usage
 - Total use
- Promote use of effluent/reclaimed/recycled water
- Promote use of irrigation and drought management plans
- Promote use/develop standardized irrigation system audit
- Develop efficiency goals
- Develop recommendation for total irrigated acreage
- Develop incentives for conservation
- Baseline information on water use is needed to measure progress.
- Reduction in water use is a meaningful indicator in some regions while water quality protection is the most important indicator in other regions.
- Environmental management is site-specific. Don't require practices (such as mandatory buffer zones, water use restrictions) if it does not make sense or improve conditions.
- Comprehensive water resource assessments should be available and conducted on golf properties.
- Superintendents need to be more educated on water issues.
- Superintendents should perform audit of irrigation system.
- There is a lack of standards and understanding on irrigation efficiency.
- Identify how many states currently have water use reporting requirements.

- Promote use of Irrigation Association golf irrigator certification course at conference and show.
- Examine implications of developing a recommendation of appropriate amount of irrigated turf for a golf course.
- Conduct more research on water efficient plants.
- Golf courses should develop irrigation and drought management plans. The time to develop drought contingency plans with local governments is during times of ample water. Decisions made during emergency situations can be damaging to golf properties if contingency plans and relationships with local officials are not developed prior to the crisis.

APPENDIX F: OVERVIEW OF 2,4-D

2,4-D (2,4-dichlorophenoxyacetic acid) is a common herbicide used around the home and garden, on golf courses, ball fields, parks, in agriculture and forestry.

Despite industry efforts claiming the safety of this chemical, there is a large body of evidence indicating major health effects, from cancer to immunosuppression, reproductive damage to neurotoxicity. Environmental contamination, particularly in wetlands has also been demonstrated, in direction infringement of the *Fisheries Act* R.S., c. F-14, s. 36.

2,4-D is a moderately persistent chemical with a half-life between 20 and 200 days.

Due to the widespread use of 2,4-D on agricultural land, the environmental effects of this use are emerging in scientific studies. Donald et al. (1999) found agricultural pesticides in wetlands, and 2,4-D was the most commonly detected pesticide. Although its concentrations in wetlands exceeded the guidelines in less than 1% of the wetlands, these guidelines are created in isolation, not accounting for the synergistic effects of pesticides. For example, Forsyth et al. (1997) found synergistic effects of picloram and 2,4-D on macrophytes. The chemical will also be carried by run-off into the local river systems. This has been demonstrated here in Ottawa, where a city report on pesticide monitoring of local tributaries showed that 60% of all samples contaminated with phenoxy herbicides. Due to the numerous acceptable uses of 2,4-D, it is likely that the majority of watersheds in rural and urban Canada are contaminated.

REFERENCES

Audubon International. "Audubon Cooperative Sanctuary Program for Golf." Accessed June 2005.
<http://www.audubonintl.org/programs/acss/golf.htm>

Audubon International. "Certified Audubon Cooperative Sanctuaries." Accessed June 2005.
<http://www.audubonintl.org/programs/acss/CACS%20List%20by%20State.pdf>

Dryden-Cripton, Stephanie. 31 March 2005. "Big Creek Watershed Characterisation Report." Guelph Water Management Group, University of Guelph. Accessed July 2005.

Environment Canada. 23 Sept 2003. "Freshwater Website: Publications - Municipal Water Pricing 1991-1999." Accessed August 2005.
http://www.ec.gc.ca/water/en/info/pubs/sss/e_price99.htm

Environment Canada. Sustainable Communities Environmental Project. Manitoba Golf Superintendents Association (MGSA). Accessed July 2005.
<http://www.pnr-rpn.ec.gc.ca/community/ecoaction/fp-pf/page.asp?lang=en&id=MB-13126>

Environmental Institute for Golf. Accessed July 2005. <http://www.eifg.org/>

Golf Course Superintendents Association of America (GCSAA) Accessed July 2005.
<http://www.gcsaa.org/resources/facts/principles.asp>

Government of Ontario. 1 December 2004. "Ontario Water Resources Act." Accessed August 2005. http://www.e-laws.gov.on.ca/DBLaws/Source/Regs/English/2004/R04387_e.htm

Green Ontario. "Green Greens: Golf Courses and the Environment." Accessed July 2005.
<http://www.greenontario.org/strategy/golf.html>

Nova Scotia Environment and Labour. 7 June 2004. "Application Requirements For Water Withdrawal Approvals." Accessed: August 2005. <http://www.gov.ns.ca/enla/water/withdrawalApproval.asp>

Pest Management Regulatory Agency. "Proposed Acceptability for Continuing Registration of 2,4-D." Accessed August 2005. <http://www.pmra-arla.gc.ca/english/pdf/pacr/pacr2005-01-e.pdf>

Royal Canadian Golf Association. Accessed July 2005.
<http://rcga.org/english/GreenSection/guidelines.asp>

Sierra Club of Canada, Atlantic Chapter. "Dealing with Golf Courses." Accessed July 2005.
<http://www.sierraclub.ca/atlantic/pesticides/golfcourses.htm>