

PRACTICAL ENVIRONMENTAL MANAGEMENT



**Presented
by:**

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Venue:

Sustainable Turfgrass Management in Asia
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Seminar Summary:

- 1. Introduction**
- 2. Environmental management planning**
 - Evaluation
 - Planning
 - Policy
 - Implementation
 - Assessment and documentation
- 3. Environmental categories / Project ideas**
 - Wildlife Habitat Management
 - Chemical Use / Reduction / Safety
 - Water Conservation
 - Water Quality Management
 - Outreach & Education
 - Maintenance Facility
- 4. Record Keeping**
- 5. Case Studies**
- 6. Resources**

1. Introduction

Golf courses and the way golf courses are being managed are becoming more scrutinized. Most Golf Course Superintendents are very active in preserving the land and protecting the environment – lets face it many of us entered the industry because we love the outdoors and nature.

We as turfgrass managers must be proactive with our environmental approach and make positive changes without waiting for local authorities to dictate how we should be managing our properties. We must show that we are true care takers of the land.

This seminar is designed to outline a practical environmental management approach - outlining a working plan to get you started while highlighting key projects and ideas that can be incorporated into your management plans.

You may also have great success stories that can be shared in the last part of the seminar.

2. Environmental management planning

Evaluation

Understanding the internal and external management context at your club is necessary for developing goals and objectives. In many cases the Golf Course Superintendent must develop programs and be the “leader” in developing a well thought out plan that can be presented to the management and members of the golf club.

You will need to spend time to review and make notes in relation to:

- Type of golf course you are at?
- Review the clubs general operations
- Organizational chart and interacting departments / managers
- Current greens committee / GM
- Key staff within your department
- Budget of your department
- Golfers / expectations
- Local government regulations

You need to review and understand the environmental context in which you are working.

| GOLF CLUB | SURROUNDING LAND USE | WATER SHED / PLANT COMMUNITY | ECOLOGICAL REGION |
|--|-------------------------|---------------------------------|----------------------|
| Your management decisions and actions may impact all spheres | | | |

Planning

When developing your environmental plan take time to:

- Set goals
- Set target dates
- Assign responsibility to others / key staff who can support your programs
- Keep things simple to start so you can achieve goals and move forward
- The plan can keep changing

Things you can do / develop part of your environmental plan:

- Department / club policy or mission statement
- Fact sheet – details of your club, golf course, environment
- Course areas
- Wildlife and plant inventory
- Checklists

Always think – What are the questions that members or guests ask when they visit the club and prepare yourself in advance. This can really help you when you start to conduct a tour of your golf course or develop outreach and education programs.

Below is an example of an environmental plan from Audubon International. If environmental management is new to you, you may find that you will respond “No” or “Partially Implemented” to many of the management practices listed in the Environmental Plan. Don’t be discouraged. Remember, this is not a test. The Environmental Plan presents a full range of environmental management practices and serves as a way to identify your current strengths, as well as future priorities and areas for improvement.

Environmental Planning

Purpose: *To evaluate, plan, and document environmental management practices that balance the demands of golf with our responsibility to the natural environment. To safeguard the quality of the environment and responsibly care for the land, water, wildlife, and natural resources upon which the course is sustained.*

| Environmental Management Practices | Y e s | P a r t i a l | N o Planned Efforts Indicate <i>start date</i> and <i>completion date</i> or “ <i>ongoing</i> ” for projects that are only partially implemented or not yet begun. Explain practices that are not applicable here. |
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| Goal 1: Planning | | | |
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| <i>To make a commitment to environmental stewardship, plan projects that ensure overall environmental quality, and evaluate progress toward achieving goals and objectives on a yearly basis.</i> | | | |
| 1. We have reviewed <i>The Guide to Environmental Stewardship on the Golf Course</i> and understand that this resource will help us to conduct various environmental projects and practices. | | | |
| 1. We have started a <i>Resource Advisory Group</i> to help plan and implement environmental projects and educational efforts on the golf course. | | | |
| 1. We evaluate progress toward goals and objectives <i>at least once per year</i> . | | | |
| 1. We train all employees regarding the importance of environmental performance and specific techniques for ensuring environmental quality. | | | |
| 1. We regularly communicate to employees, customers, stakeholders, and community members about environmental goals, issues, project implementation, and progress. | | | |
| Goal 2: Documentation | | | |
| <i>To document environmental efforts to assist with planning and track progress.</i> | | | |
| 1. We regularly take pictures of and around the golf course to document our efforts. (NOTE: See page 30 for more details.) | | | |
| 1. We regularly update a list of the wildlife we see or hear on the property. (NOTE: See page 30 for more details.) | | | |
| 1. We have created a map of the golf course that illustrates natural areas and buffers. (NOTE: See page 30 for more details.) | | | |
| 1. We have established baseline data for representative water bodies and water sources that may be adversely affected by golf course operations. (NOTE: See page 24 for more details.) | | | |
| <i>Person(s) responsible for overseeing Environmental Planning efforts- please list name(s):</i> | | | |

Notes:

Wildlife and Habitat Management

Purpose: *To enhance natural areas and landscaping on the golf course to protect and sustain native habitats and the wildlife that depend on them for survival.*

| <p style="text-align: center;">Environmental Management Practices</p> | <p style="text-align: center;">Y e s</p> | <p style="text-align: center;">P a r t i a l</p> | <p style="text-align: center;">N o</p> | <p>Planned Efforts Indicate <i>start date</i> and <i>completion date</i> or <i>“ongoing”</i> for projects that are only partially implemented or not yet begun. Explain practices that are not applicable here.</p> |
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| <p>Goal 1: General Knowledge</p> | | | | |
| <p>To continually expand our general knowledge of the plants, wildlife species, and habitats found on our golf course.</p> | | | | |
| <p>1. We have identified core habitats, such as mature woodlands, wetlands, or stream corridors, and special habitat concerns, such as endangered or threatened species, on the property.</p> | | | | |
| <p>1. We train staff to understand that management practices may positively enhance or adversely impact wildlife species and habitats on the property.</p> | | | | |
| <p>1. We have identified the dominant indigenous (native) plant community and ecological region in which the golf course is located.</p> | | | | |
| <p>1. We maintain an on-going written inventory of at least bird and mammal species to document and track wildlife use of the property. Additional inventories may include amphibians, reptiles, fish, and other wildlife, and plants, such as trees, shrubs, and herbaceous species (non-woody plants).</p> | | | | |
| <p>Goal 2: Wildlife Habitat: Space, Food, Cover, and Water Enhancements</p> | | | | |
| <p>To improve minimally used and landscaped areas to provide habitat for a variety of wildlife species.</p> | | | | |
| <p>1. We maintain natural wildlife habitat in at least 50% of all minimally used portions of the property.</p> | | | | |

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| 1. We have connected wildlife habitat areas -- such as woods, meadows, stream corridors, and ponds -- to others inside and outside our property boundaries, with corridors of natural vegetation. | | | | |
| 1. We maintain or plant varying <i>heights</i> and <i>types</i> of plants, from ground cover to shrub and tree layers in habitat areas such as woods, desert, or prairie (<i>e.g.</i> , in woodlands-leave understory, in tall grass areas-maintain grasses and herbaceous plants). | | | | |
| 1. We leave dead trees standing when they do not pose a safety hazard. | | | | |
| 1. We maintain a water source for wildlife <i>with aquatic plants</i> and <i>shrubbery or native landscaping along the shoreline (i.e., not turfgrass)</i> . This could be a pond, stream, wetland, or river corridor. On smaller properties, this may also include a birdbath or created “backyard” pool. | | | | |
| 1. We have naturalized at least 50% of our <i>out-of-play</i> shorelines with emergent-aquatic and shoreline plants. Special attention is given to shallow water areas (<2ft. deep) since wildlife is most abundant when shallow water includes emergent aquatic vegetation. | | | | |
| 1. We choose flowers for gardens or container plants that will provide nectar for hummingbirds or butterflies. | | | | |
| Environmental Management Practices | Y | P | N | Planned Efforts |
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| 1. We maintain nesting boxes or other structures to enhance nesting sites for birds or bats. (OPTIONAL PROJECT) | | | | |
| Goal 3: Habitat Protection and Biodiversity Conservation | | | | |
| <i>To preserve the rich biological diversity of our region by protecting existing native habitats and species, and landscaping primarily with indigenous (native) plants.</i> | | | | |
| 1. All mitigation projects required by permit have been completed according to law. | | | | |

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| 1. We protect wildlife habitats, and any endangered or threatened wildlife or plant species, from disturbance by golfers and maintenance activities as per law and through buffers, mounted signs, fencing, or designated “environmentally-sensitive zones” (as per USGA rules). | | | | |
| 1. We establish and maintain at least 80% of the landscaped trees, shrubs, and flowers, excluding turfgrass, with plants that are indigenous to the native plant community of the ecological region of the property. | | | | |
| 1. We purchase landscape plants from locally-grown sources, whenever possible, to support the genetic integrity of local native plant communities. | | | | |
| 1. We avoid disturbing known bird nests or den sites until after young have dispersed. We stake or flag such areas when needed (e.g., rope killdeer nests; avoid removing shrubs or trees during bird nesting season if nests are present; do not mow fields until after bird nesting season). | | | | |
| 1. We have restored degraded habitats, such as eroded slopes, compacted soils, polluted water sources, or areas overrun with invasive exotic species. | | | | |
| 1. We clean up trash from habitat areas when necessary. | | | | |
| 1. We do our best to confine roads, cart paths, trails, and necessary vegetation removal to the edges of existing habitats to minimize habitat disturbance and fragmentation. | | | | |
| <i>Person(s) responsible for overseeing Wildlife and Habitat Management efforts- please list name(s):</i> | | | | |

Notes:

Chemical Use Reduction and Safety

Purpose: *To ensure safe storage, application, and handling of chemicals and reduce actual and potential environmental contamination associated with chemical use.*

| <p style="text-align: center;">Environmental Management Practices</p> | <p style="text-align: center;">Y e a r s</p> | <p style="text-align: center;">P r o j e c t s</p> | <p style="text-align: center;">N o t a p p l i c a b l e</p> | <p style="text-align: center;">Planned Efforts Indicate <i>start date</i> and <i>completion date</i> or <i>“ongoing”</i> for projects that are only partially implemented or not yet begun. Explain practices that are not applicable here.</p> |
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| <p>Goal 1: General Knowledge <i>To continually expand our knowledge of integrated pest management, chemical use issues, best management practices, and alternative pest control methods.</i></p> | | | | |
| <p>1. We meet all state and OSHA regulations that apply to storage and handling of chemicals used on the property.</p> | | | | |
| <p>1. We train all of our key maintenance staff in the basic tenets of integrated pest management, including: (1) scouting and monitoring; (2) selecting thresholds; (3) making decisions based on treatment options; (4) proper timing and spot treatment; (5) documenting and evaluating results.</p> | | | | |
| <p>1. We train all of our key maintenance staff to recognize that chemical manufacturing, use, storage, and disposal may pose risks to human health and the environment.</p> | | | | |
| <p>1. We train all of our key maintenance staff to understand that poor management practices may adversely impact worker health, on- and off-site water quality, local soil health, and wildlife species and their habitats.</p> | | | | |
| <p>Goal 2: Cultural Practices and IPM Techniques <i>To maintain turfgrass in a vigorous and healthy state through sound cultural practices and integrated pest management techniques.</i></p> | | | | |
| <p>1. We maintain green, tee, and fairway mowing heights at levels that can be reasonably maintained on a day-to-day basis without continually stressing turf or maximizing chemical inputs.</p> | | | | |
| <p>1. We have inventoried soil types for all playing surfaces and assessed conditions such as soil structure, nutrient levels, organic content, compaction, and water infiltration.</p> | | | | |

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| 1. We regularly work to improve soil health. This may include: amending organic content, aerating, and improving water infiltration to cultivate a diverse, living biotic soil community. | | | | |
| 1. Decisions regarding fertilizer applications are based upon soil test information. | | | | |
| 1. We strive to maximize turf health and minimize resource inputs by improving turf conditions. | | | | |
| 1. We plant more pest-resistant or stress-tolerant cultivars on playing surfaces and in landscaping. We select plant species/ cultivars best suited for our climate, soils, and growing conditions. | | | | |
| 1. We continually improve and manage plant materials for landscaped areas, gardens, and larger wildlife habitats to maximize health and minimize resource inputs. | | | | |
| 1. We have designated and trained scouts to monitor plant health and pest populations as part of our IPM program. | | | | |
| Environmental Management Practices | Y | P | N | Planned Efforts |
| 1. We have identified and recorded turf “hot spots” where disease or insect outbreaks first occur. We have also identified other areas where poor growing conditions often lead to problems. | | | | |
| 1. We use scouting forms to record the type, severity, location, and treatment of pest problems. | | | | |
| 1. We have established aesthetic and functional thresholds for <i>insects</i> for all managed areas. | | | | |
| 1. We have established aesthetic and functional thresholds for <i>fungus diseases</i> for all managed areas. | | | | |
| 1. We have established aesthetic and functional thresholds for <i>weeds</i> for all managed areas. | | | | |

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| 1. We evaluate potential control measures, including alterations in cultural management, biological, physical, and mechanical controls, and chemical methods. | | | | |
| 1. We consider the environmental impact of pest control measures, e.g. leaching and runoff potential, toxicity to non-target organisms, soil absorption capacity, pesticide persistence, water solubility, effects on soil microorganisms. | | | | |
| 1. We actively work to reduce turf stresses and change cultural practices or other conditions to prevent or discourage recurrence of problems. | | | | |
| 1. We maintain records of treatments employed <i>and their effectiveness</i> and use them to guide future pest control decisions. | | | | |
| Goal 3: Best Management Practices for Chemical Use | | | | |
| <i>To apply all chemical products in a manner that minimizes harmful environmental impacts.</i> | | | | |
| 1. Pesticides are applied by a trained, licensed applicator or as directed by law. | | | | |
| 1. We maintain a current MSDS (Material Safety Data Sheet) for each chemical at our facility. | | | | |
| 1. When using chemical products, staff always read and follow label directions. | | | | |
| 1. We apply pesticides only when and where scouting indicates that pest threshold levels have been exceeded. | | | | |
| 1. We strive to treat problems at the proper time and under the proper weather conditions to maximize effectiveness and minimize harmful environmental impacts. | | | | |
| 1. We employ practices and use products that reduce the potential for contamination of ground and surface water, e.g., curtains on application equipment, spoon-feeding, slow-release products, selected natural organic products. | | | | |

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| 1. We have eliminated potential chemical runoff and drift by avoiding applications during high winds or prior to heavy rains. | | | | |
| Environmental Management Practices | Y es | P ar tial | N O | Planned Efforts |
| 1. We have established “no spray zones” and buffer areas, particularly around water features and other environmentally sensitive areas. We have communicated these areas via map or site tour to all staff that apply fertilizers or pesticides. | | | | |
| Goal 4: Communication and Education | | | | |
| <i>To ensure that maintenance staff are properly trained and supervised.</i> | | | | |
| 1. We regularly train and encourage continuing education for maintenance staff, including state licensing, professional association training, and IPM certification. <i>If applicable</i> , we provide non-English speaking employees with training in their native languages. | | | | |
| 1. We communicate with employees and clientele regarding our IPM program to maintain a dialogue regarding thresholds, epidemics, and control measures in relation to environmental quality. | | | | |
| 1. We communicate with the green committee, club manager, and club pro, as appropriate, to coordinate and assure support for needed golf maintenance activities. | | | | |
| Goal 5: Maintenance Facility and Equipment | | | | |
| <i>To ensure that chemicals are properly stored and handled, and equipment is properly maintained to reduce the potential for negative environmental impacts.</i> | | | | |
| 1. We organize our maintenance facility for efficient and proper storage of equipment and supplies. | | | | |
| 1. We properly calibrate all equipment used to apply materials. | | | | |

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| 1. We prevent gasoline, motor oil, brake and transmission fluid, solvents, and other chemicals used to operate and maintain equipment and vehicles from contaminating soils, surface waters, or ground water. | | | | |
| 1. When cleaning and maintaining our equipment, water does not directly drain into surface water (e.g., lake, pond, stream, wetland). | | | | |
| 1. Our chemical storage structure is secure and well ventilated. Personnel access is limited. | | | | |
| 1. We properly store all chemicals. Pesticides and fertilizers are stored on plastic or metal shelving to keep them off the floor. | | | | |
| 1. We store liquid products below dry materials. | | | | |
| 1. We handle all pesticides over an impermeable surface. A spill containment kit is readily available and spill containment procedures are in place. | | | | |
| 1. We triple rinse, puncture, and properly dispose of empty chemical containers. | | | | |
| <i>Person(s) responsible for overseeing Chemical Use Reduction and Safety efforts- please list name(s):</i> | | | | |

Additional Maintenance Facility Standards

The following maintenance facility specs are considered standard for environmentally-responsible chemical storage and handling. Because they involve *infrastructure* standards, we strongly recommend them to all golf courses, but do not require them for certification in the ACSP for Golf Courses. Use this information to self-audit your maintenance facility, anticipate problems or liability areas, and address concerns.

| Environmental Management Practices | Y | P | N | O | Planned Efforts |
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| 1. Fuel is stored on an impervious surface that has spill containment and a roof. | | | | | |
| 1. Chemical storage structure is fire proof. | | | | | |

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| 1. Explosion proof lights are used in chemical storage and maintenance areas. | | | | |
| 1. Chemical storage area has a sealed metal or concrete floor, and spills are contained by a sump located near the middle of the floor, and a lip along the edges. | | | | |
| 1. Grass clippings are blown off equipment with compressed air instead of, or prior to, washing with water. | | | | |
| 1. A catch basin to collect grass clippings, grease, and oils is installed and maintained. | | | | |

Notes:

Water Conservation

Purpose: *To ensure adequate water supplies not only for irrigation, but also for the healthy ecological functioning of water bodies, such as rivers, streams, wetlands, lakes, and ponds.*

| Environmental Management Practices | Yes | Partial | No | Planned Efforts |
|---|------------|----------------|-----------|------------------------|
| Goal 1: General Knowledge | | | | |
| To identify golf course water sources and make a commitment to judicious and responsible water use. | | | | |
| 1. We train our employees to conserve water and make water conservation a priority in our management approach. | | | | |
| 1. All of our key maintenance staff are able to identify the water sources used for irrigation and drinking water. | | | | |
| 1. Our course superintendent and irrigation technicians have been trained and know how to correctly operate and manage the irrigation system. | | | | |
| Goal 2: Water Conservation: Retention Structures, Irrigation Equipment, and Plumbing Fixtures | | | | |
| <i>To maintain irrigation equipment for maximum efficiency and minimal water waste.</i> | | | | |
| 1. There is no uncontrolled release of water out of water retention structures. | | | | |

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| 1. Our irrigation system is properly designed, correctly installed, and performance has been tested. | | | | |
| 1. We check our irrigation system for proper water distribution in all irrigated areas at least once per year. | | | | |
| 1. We adjust rotation speed and operating pressure to match sprinkler spacing to nozzle performance. | | | | |
| 1. We check all irrigation equipment daily and regularly maintain the system on a regular schedule. | | | | |
| 1. We fix leaks in a timely manner. | | | | |
| 1. We have eliminated all non-target watering (e.g., side walks, ponds, habitat areas). | | | | |
| 1. Our pump station is regularly maintained and is working efficiently. | | | | |
| 1. We have upgraded our irrigation system, or components of our system (e.g., valves, sprinkler heads, nozzles, computer software), to reduce inefficiency and malfunction and reduce water use. | | | | |
| 1. We have installed part-circle irrigation heads where possible to save water. | | | | |
| Environmental Management Practices | Yes | Partial | NO | Planned Efforts |
| Goal 3: Water Conservation: Watering Practices and Turf Care | | | | |
| <i>To implement water conservation practices. To maintain soil and turf health that maximizes water absorption and minimizes water loss to evaporation and runoff.</i> | | | | |
| 1. We incorporate evapotranspiration rates or weather data into our daily irrigation decisions. | | | | |
| 1. We avoid running our irrigation system at peak evapotranspiration times. | | | | |
| 1. We water “hot spots” to target needed areas only, rather than running the entire irrigation system during the peak of the day. | | | | |

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| 1. We work to maintain an effective water cycle to maximize water absorption and reduce runoff and evaporation, including: maintaining soil cover, improving soil structure, adding or maintaining natural organic matter in the soil, and improving drainage to minimize runoff and maximize water penetration through soil layers. | | | | |
| 1. We have reduced or eliminated irrigation on all unused or minimally used portions of the property. | | | | |
| 1. We monitor daily water use, tally monthly usage, and set targets for yearly improvement. | | | | |
| 1. The turfgrass on our greens, tees, and fairways is appropriate for our local climate and growing conditions. | | | | |
| <i>Person(s) responsible for overseeing Water Conservation efforts- please list name(s):</i> | | | | |

Notes:

Water Quality Management

Purpose: *To ensure clean water supplies and protect the health and integrity of water bodies, such as oceans, rivers, streams, wetlands, lakes, ponds, and aquifers.*

| Environmental Management Practices | Y e s | P a r t i a l | N o | Planned Efforts |
|---|----------------------|--|----------------|------------------------|
| Goal: General Knowledge | | | | |
| <i>To improve our general knowledge regarding water quality protection and pollution prevention as it relates to golf course management, chemical storage and use, and equipment maintenance.</i> | | | | |
| 1. Protecting water quality both on and off the golf course is a management priority. All of our key maintenance staff are trained regarding water quality concerns and priority given to pollution prevention. | | | | |

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| 1. All of our key maintenance staff (<i>e.g.</i> , superintendent, assistant superintendent, crew foreman, irrigation technician, chemical spray technician) are able to identify the specific <i>watershed</i> in which the property is located. | | | | |
| 1. All of our key maintenance staff are able to identify where wastewater and runoff go after leaving the property. | | | | |
| Goal 2: Best Management Practices (BMP) <i>To employ best management practices or structural controls near all water bodies to eliminate the potential for chemical runoff, nutrient loading, erosion, and drift.</i> | | | | |
| 1. We have eliminated/mitigated erosion to water bodies such as streams, lakes, and ponds. | | | | |
| 1. We employ more environmentally-sensitive plant management techniques within 25 feet of all water bodies and well heads to minimize nutrient and chemical inputs. | | | | |
| 1. We prevent fertilizers, pesticides, lawn clippings, soil and other landscaping materials from collecting on and running off impervious surfaces. | | | | |
| 1. We have eliminated potential chemical runoff and drift near all water bodies by designating “no spray” zones, using spot treatments, increasing thresholds for pest problems, using covered booms, and taking the weather into account prior to application. | | | | |
| 1. Where shorelines are in play, we raise the mowing height along the water’s edge to slow and filter runoff. (Research has shown that, on a slight slope, a 25- foot buffer of 3- inch turf provides filtering benefits.) | | | | |
| 1. We reduce the potential for nutrient loading to water bodies, such as streams, lakes, and ponds, by employing BMPs such as: using slow-release fertilizers, spoon-feeding, filtering drainage through vegetative or mechanical filters prior to entering water bodies. | | | | |

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| 1. We calibrate and adjust fertilizer and pesticide equipment to prevent misapplication. | | | | |
| 1. We maintain and clean maintenance equipment in a manner that eliminates the potential for on-site or off-site contamination of water bodies. | | | | |
| 1. We store all chemicals in a manner that eliminates the potential for on-site or off-site contamination of water bodies. Proper spill containment is in place. | | | | |
| Environmental Management Practices | Y | P | N | Planned Efforts |
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| 1. We mix and load pesticides in an area that guarantees spill containment. | | | | |
| 1. We handle and apply fertilizers, pesticides, and other chemicals in a manner that eliminates potential on-site or off-site contamination of water bodies. | | | | |
| 1. We dispose of all chemical containers and all waste materials in a manner that eliminates the potential for on-site or off-site contamination of water bodies. | | | | |
| 1. We reduce/eliminate the need for chemical algae control in ponds through proper aeration, nutrient reduction, bio-filters, vegetation management, or bio-controls. | | | | |
| 1. When aquatic weed management is required, we seek a physical solution (<i>e.g.</i> , hand removal of plants) first, and then seek the least toxic method of chemical weed control. We also address any underlying causes of the problem. | | | | |
| Goal 3: Water Quality Management: Monitoring | | | | |
| <i>To visually and objectively monitor the health of water features to detect impaired water quality, identify causes, and correct problems as needed.</i> | | | | |
| 1. We visually monitor water bodies for water quality problems, such as erosion, algae, aquatic “weed” growth, fish kills, sediment buildup, <i>etc.</i> , as part of regular IPM scouting activities. | | | | |

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| 1. We report water quality problems immediately to supervisors and, if required, regulatory agencies for appropriate action. | | | | |
| 1. We have established baseline data for representative water bodies and water sources that may be adversely affected by golf course operations. Testing practices include: a.) If there is a creek/stream/river that flows through the golf course, water is tested where water enters and exits the property. b.) Physical characteristics: dissolved oxygen, pH, temperature, and specific conductivity. c.) Nutrients- nitrogen (nitrate and ammonia) and total phosphorus. * d.) Macroinvertebrates- surveys for aquatic organisms to determine water quality in streams. * e.) Baseline tests conducted 4x/year for at least a year. f.) Re-test water sources at least one time per year, or sooner if problems occur. | | | | |
| 1. We keep written records of monitoring activities, results, and control measures taken if needed. | | | | |
| <i>Person(s) responsible for overseeing Water Quality Management efforts- please list name(s):</i> | | | | |

* Test creeks/streams/river for dissolved oxygen, pH, temperature, and specific conductivity. In addition, testing for either nutrients OR macroinvertebrates must be conducted. For instructions on conducting macroinvertebrate surveys visit www.auduboninternational.org/e-source. All irrigation sources must be tested for nutrients.

Notes:

Outreach and Education

Purpose: *To ensure ongoing support for stewardship initiatives, strengthen local community connections, and extend participation in environmental conservation activities.*

| <p style="text-align: center;">Environmental Management Practices</p> | <p style="text-align: center;">Y e s</p> | <p style="text-align: center;">P a r t i a l</p> | <p style="text-align: center;">N o</p> | <p>Planned Efforts Indicate <i>start date</i> and <i>completion date</i> or “<i>ongoing</i>” for projects that are only partially implemented or not yet begun. Explain practices that are not applicable here.</p> |
|--|--|--|--|--|
| <p>Goal 1: General Knowledge <i>To improve our ability to communicate our commitment to environmental stewardship and implement conservation activities.</i></p> | | | | |
| <p>1. We have contacted at least one member of the local community or one community organization (not affiliated with the golf course) to participate in our project planning or implementation.</p> | | | | |
| <p>1. We have formed a <i>Resource Advisory Group</i> to help plan and implement environmental projects and educational efforts on the golf course.</p> | | | | |
| <p>1. We provide all <i>Resource Advisory Group</i> members with information regarding Audubon International and the Audubon Cooperative Sanctuary Program.</p> | | | | |
| <p>1. We communicate our environmental goals, objectives, and projects to patrons, staff, decision makers, and community members.</p> | | | | |
| <p>Goal 2: Outreach and Involvement <i>To provide opportunities for patrons, staff, decision makers, and community members to contribute to environmental projects on the golf course.</i></p> | | | | |
| <p>1. We invite employees, patrons, and community members to be involved in our <i>Resource Advisory Group</i>.</p> | | | | |
| <p>1. We invite employees, patrons, and community members to help with stewardship projects. We provide <u>at least two</u> of the following activities to encourage participation:</p> <ul style="list-style-type: none"> • Mounting or monitoring nest boxes with community assistance. • Helping with wildlife gardens projects. • Helping with ecological restoration projects. • Inventorying wildlife species. | | | | |

| | | | |
|---|----------------------|--|----------------|
| <ul style="list-style-type: none"> • Maintaining or using a nature trail. • Providing a hole-by-hole guide to environmental stewardship. • Hosting wildlife walks on or around the golf course. • Hosting tours of the golf course for patrons, staff, or community groups to showcase different stewardship projects. • Hosting tournaments to support environmental stewardship projects. • Hosting workshops on stewardship projects or environmental issues. • Providing information to patrons, staff, decision makers, and community members on Audubon International's <i>Treasuring Home</i> Initiative. • Sponsoring a local school's involvement in the ACSP for Schools. • Other: | | | |
| Environmental Management Practices | Y E S | P a r t i a l | N O |
| Planned Efforts | | | |
| Goal 3: Education <i>To educate patrons, staff, decision makers, and community members about programs and projects on the golf course which improve environmental quality.</i> | | | |
| 1. We maintain a display that describes our involvement in the ACSP and highlights stewardship projects taking place on the course. | | | |
| 1. We have written materials available to patrons that describe our involvement in the ACSP or highlight different stewardship projects taking place on the course (e.g., brochures, regular newsletter articles, signs, posters, yardage book, Audubon Newsletter, scorecard). | | | |

| | | | |
|--|--|--|--|
| <p>1. We communicate with neighboring property owners, home owners association, or key community contacts to explain our involvement in the ACSP and various stewardship projects (<i>e.g.</i>, letters to neighbors; press releases; presentations at workshops, seminars, committee meetings).</p> | | | |
| <p><i>Person(s) responsible for overseeing Outreach and Education efforts- please list name(s):</i></p> | | | |

Developing an environmental policy at your club

An environmental policy is a written document in which the golf club states its overall aims and principles of action in relation to the environment. The environmental policy is the foundation for setting environmental objectives.

Involve active discussion with club members, employees and other key people in the golf club.

Sample policy:

Environmental Policy

We as members and employees ofGolf Club are proud to announce our commitment to helping to safeguard and enhance the natural environment. We recognize that respect for the environment goes hand in hand with human well being and sporting excellence.

In golf harmonious integration with nature and the wise use of natural resources are the proper goals of all responsible managers. Our policy has four main elements:

1. Good housekeeping – to adopt best practices for the course, clubhouse and surrounds in order to minimize adverse environmental impacts and to optimize the use of natural resources.
2. Compliance with relevant regulations – to ensure our clubs activities are in compliance with all local and national regulations.
3. Conservation of biodiversity – to maximize the ecological potential of the golf course.
4. Communication and education – to ensure that our environmental attitude, policies and practices are accurately perceived by members, visitors and the public and top provide appropriate training and information for employees.

It is the clubs goal to achieve continual improvement in its environmental performance. We intend to enhance both the ecological value and the recreational enjoyment o be derived from this golf course and to ensure that our commitment to responsible environmental management is recognized in the wider community. We believe golf can serve as a role model for environmental good practice. In this way..... Golf Club is committed to environmental excellence.

Signed: _____ Date: _____

Environmental Categories / Project idea

A. Wildlife Habitat Management

As a Golf Course Superintendent not only are you managing the daily activities of the golf course and keeping the members happy, you must balance and pay close attention to key factors which affect wildlife habitat management, for example SPACE, FOOD, COVER and WATER. These factors can affect the wildlife populations you can attract and sustain.

Essentially you are managing non-play areas to provide habitats for wildlife.

- Maximize use of available space
- Landscape design – use height scale
- Create diversity (food chain)
- Connect food, cover and water wherever possible to maximize habitats - corridors

Things you can do:

| | |
|--|---|
| <ul style="list-style-type: none">• Identify wildlife and their habitats• Surveys during breeding season and population peak / winter• Identify native plant species / food sources• Native areas• Gardens / Butterflies / food source• Woodland management | <ul style="list-style-type: none">• Nest boxes• Eradicate noxious plant species• Involve local groups• Educate members and staff• Shoreline vegetation / buffer zones• Wetland areas• Protected zones |
|--|---|

Biodiversity = Biological diversity

Biodiversity is the totality of:

- Genes
- Species and
- Ecosystems

in a region.

To preserve biodiversity , the Superintendent can

- Protect
- Expand and
- Connect

native habitats

B. Chemical Use / Reduction / Safety

The Superintendent has a lot of responsibility within and around the workplace. The Superintendent must ensure the safe storage, application and handling of chemicals and reduce actual and potential environmental contamination associated with chemical use.

Things you can do:

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|--|--|
| <ul style="list-style-type: none"> • Develop cultural programs to increase turfgrass health • Be aware of suitable mowing heights • Soil and water testing • Chemical labels / MSDS manuals for all products • Label books easily accessible • Pesticide application sheets and record use after application • Total yearly pesticide use kg / liters | <ul style="list-style-type: none"> • Training staff with proper ID of diseases, weeds, insects. • Learn active ingredients and best options to use safer products. • Supply of full safety clothing, masks, boots for staff. • Initiate technical support from chemical companies / distributors • Keep containment booms and spill kits / sand handy near critical zones |
|--|--|

C. Water Conservation

Careful water use in golf course irrigation is not only environmentally and fiscally sound, but also is essential to promote healthy turfgrass that is better able to tolerate environmental stress and resist insect pests, weeds and disease.

Golf facilities must pro-actively conserve water. Conserving water on golf facilities is essential to becoming a sustainable business. Optimizing the acreage of irrigated turfgrass, implementing best management practices, utilizing technology to make water application decisions, conducting an irrigation system audit along with an audit of the non-golf course water uses at the entire facility are key to becoming responsible users of water.

Things you can do

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|---|--|
| <ul style="list-style-type: none"> • Proper grass selection • Mowing heights and cultural programs • Out of play native areas • Hard line irrigation heads near out of play native / forests, river edges • Intense cultural programs eg vertidrainage, coring, slicing • Soil probing • Sensors • Use of slow release and liquid fertilizers for controlled N application • Irrigation audits / preventative maintenance checks • Pump station service • Record pump station flow meter – outgoing water. | <ul style="list-style-type: none"> • Leak detection of lateral lines • Educate club operations to detect leaks and stuck heads – reporting • Work with club to review clubhouse water conservation eg taps, showers, toilets • Large water tanks at the maintenance shed to collect water and re-use • Course signage • Reduce turfgrass stress compaction / traffic • Use of wetting agents – injection system • Closely watch future weather forecasts |
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D. Water Quality Management

Golf Course Superintendents must ensure that water bodies within and surrounding the golf course property are fully protected and enhanced. Water quality monitoring provides a valuable tool for evaluating whether management practices are working.

Things you can do

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| <ul style="list-style-type: none"> • Test incoming – outgoing water into the site • Buffer planting zones around lakes and rivers • Vary buffer zone widths to suit course design / out of play areas • Do not spray close to water bodies • Be aware of products that could be toxic to fish and animals • Calibrate spray tanks / nozzles • Conduct macro invertebrate surveys within water bodies • Physical removal aquatic weeds | <ul style="list-style-type: none"> • Source non invasive, local wetland plants for aquatic areas • With new courses ensure littoral shelves are placed at correct depths for plant material • Reduce any erosion near water bodies • Make sure wash bay and chemical fill station do not drain near any water body • Report any mishaps to proper local authorities |
|---|--|

E. Outreach and Education

Definitely one of the most enjoyable and rewarding categories to work on and it may be daunting at first but remember you are probably doing so much already at your facility so

don't be afraid to share your experiences, promote the efforts of your staff / club and motivate others to take positive action.

Record keeping in this area is critical so you have information on hand to use for future club member updates or media releases.

Things you can do:

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|--|--|
| <ul style="list-style-type: none"> • Member updates • Press releases • Course signage • Recognition for staff • Staff training • Nature trail • Inventory of wildlife species | <ul style="list-style-type: none"> • Adopt a school • Field trips / host tours • Involve a bird club • Participate in National Days / local events eg Plant a Tree Day • Media, interviews, articles • Public speaking |
|--|--|

F. Maintenance Facility

The behind the scenes operation at your club has a direct bearing on the golf course presentation and professionalism of your operation and staff. Does your facility stack up? Can you start developing further programs to further protect your employees and the environment while providing an enjoyable area to work?

You should evaluate in detail your site and develop your own site assessment plan that is site specific. Get out and see other facilities that have made improvements or have a well functioning operation. Take photos to help document and present ideas to management. Most importantly involve and educate the club committee and the General Manager to ensure they are aware of their responsibilities and that you have the resources and funds available each year through your budget to start making positive ongoing changes.

Things you can do:

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|---|--|
| <ul style="list-style-type: none"> • Properly dispose of used chemicals containers, solvents, old batteries • Signage / safe working areas • Wash bay and separation with pesticides • Clipping blowing area / removal • Bunded fuel storage • Safety guards on equipment | <ul style="list-style-type: none"> • Good ventilation and lighting • Spill kits in key areas • Floor covering – non slip, easy to clean • Organize and park equipment • Collect water and store in tanks • Proper wash rack set-up • Record keeping • Involve your staff |
|---|--|

3. Record Keeping

One of the most important skills a successful Golf Course Superintendent must have is to be able to manage time and develop personal record keeping files for operations. Record keeping involves all sections of the operations from diary entries, memos, actual usage of pesticides / fuels / water etc.

As you develop many of your environmental programs it really helps having base information so you can track your progress, show improvement or document areas where your working plan must change.

There is nothing worse than gradually making some great changes over time and then having no base information / photos to gauge and show your successes.

Key records:

| | |
|--|--|
| <ul style="list-style-type: none">• Fertilizer use• Chemical use• Water quality tests• Soil tests / comparing each year• Pump station water use• Native areas / maps• Outreach / education logs• Inventories for wildlife / birds | <ul style="list-style-type: none">• Inventories for plants• Rainfall• Temperature• Humidity• Photos• Budget breakdowns / trends... does your budget codes suit your operation to track key expenses ? |
|--|--|

4. Case Studies

If you document and record your work you will be able to develop a case study for a project on your golf course. This helps you overview the successes of the project and helps you fine tune your programs.

Case studies can show environmental improvements, progress and even cost savings.

Examples could be water saving projects, waste reduction program (chipper) or the following –

“Best management practices for watering”. You will need to include and review the following:

- Main goals / targets
- Site assessment / course information on grass areas, plants and the irrigation system / pumps
- Irrigation audit and summary of pumps, heads and key information
- Overall water needs – water source, current records, alternative water source?

- Current conservation measures – scouting, leak detection, hand watering, wetting agents, pump service, traffic controls on course, cultural programs Record keeping – man hours hand watering / scouting / repairs, cost of irrigation parts, weekly / monthly and yearly water use, electricity logs for the pump station, water quality tests.
- Future plans needed
- Overview of successes

In summary here are 10 reasons for you to get involved with an external organization or environmental group to help you work through your practical environmental management plan:

1. Do the right thing for the environment
2. Enjoy a new and rewarding aspect of your job and be able to share it with others
3. Gain positive publicity for your golf course
4. Better organize and coordinate your environmental management efforts
5. Track environmental improvements
6. Save money through reduced resource use
7. Build your skill set and your resume
8. Promote your stewardship efforts
9. Be recognized as a community and golf industry environmental leader
10. Gain valuable feedback from organizations you work with

Start off with small programs and goals that are measurable and attainable.

All your improvements will ensure a better environment in the future.

5. Resources

1. Audubon International

A not for profit environmental education organization. The Audubon Cooperative Sanctuary program for golf courses is an award winning education and certification program

Contact: Joellen Lampman
Program Manager
Audubon International
46 Rarick Road
Selkirk, NY 12158
518-767-9051 ext. 114
www.auduboninternational.org
jlampman@auduboninternational.org

2. E-par

Web based environmental management system to help you plan and work through compliance issues and standards for our industry. Many templates available to help with your programs and record keeping which will save you time.

Contact: Terry Muir
www.epar.com.au
terry@epar.com.au

3. Royal and Ancient – Course Management

Articles and relevant environmental information for golf courses.

Contact: www.randa.org/coursemanagement

4. International Golf and Life Foundation

IGOLF believes that the accomplishment of Laureate Courses should be publicized; including the awarding of a certificate and media visibility.

Contact: www.golfandlife.ch/igolf-laureate-courses/

5. Golf Environment Organization

The Golf Environment Organization (GEO) mission is to work with the industry to raise standards, achieve tangible outcomes and objectively appraise performance. The main aim is to strengthen the golf industry, enhance and enrich the environment and encourage sustainable lifestyles.

Contact: www.golfenvironment.org

6. Australian Golf Course Superintendents Association (AGCSA)

Contact: www.agcsa.com.au

7. Golf Course Superintendents Association of America (GCSAA)

Contact: www.gcsaa.org