

# Sustainability Certification Workbook for Golf Course Landscapes



The step-by-step guide for golf course superintendents interested in having their golf course Certified by Audubon Lifestyles and earning the Seal of Sustainability from the International Sustainability Council.



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*A journey of 1000 miles starts with a single step, so the saying goes. That is the same philosophy that the ISC-Audubon Platinum Member Sustainability Programs are based on.*

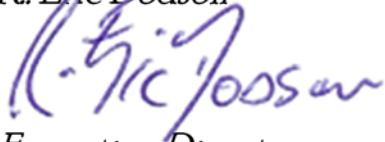
*Over the past couple of decades many programs have been created that all have a focus on getting people to “save the earth” where they live, work and play. While that is certainly a laudable goal, the fact of the matter is that most of these programs are so complicated and so expensive that the vast majority of people do not participate in them.*

*What we are focusing on are the ten most important actions that people can take at home or at their places of business that will truly make a difference. We believe that this approach is more easily understood and that the proposed actions are keys to improving the quality of the environment in cost effective and meaningful ways.*

*It has been said that in many cases it is the first few actions taken that make the biggest difference and the last few are the most expensive and least beneficial. Becoming Certified from Audubon Lifestyles, and earning the Seal of Sustainability from the International Sustainability Council as demonstrated by taking the ten actions outlined in this program workbook might just be a single step, but when one thousand individuals take those same measures we truly create a meaningful journey toward improving the quality of the environment, and gain the monetary rewards associated with being more sustainable at the same time.*

*We are trying to save the earth, one person, one place at a time please join us in this journey!!*

*R. Eric Dodson*



*Executive Director*

*ISC-Audubon*



## **The Sustainable Golf Facility Program**

The Sustainable Golf Facility Program is a voluntary program that sets the bar for sustainably sited, designed, constructed and managed golf facilities. Not every facility will choose the path toward sustainability, but those that do will become leaders in the industry that stand the test of time.

The basic objective of The Sustainable Golf Facility Program is to reduce the consumption of non-renewable resources, minimize waste, create healthy, productive environments, and inform the public, residents, guests, clients and employees about the benefits of sustainably managed golf facilities.

Through participation in the program, ISC-Audubon is able to assist golf facility managers, staff, and planners who desire to manage and operate their golf facilities sustainably. The program is geared toward assisting those seeking to become local, regional, national and international models of sustainability by incorporating sustainable principles, concepts, and management strategies.

Everyone has responsibilities for the future of our planet. This includes responsibilities at home, work, and in society in general. It is incumbent on each of us to take positive actions toward the common goal for being socially, environmentally and economically responsible where we live, work and recreate.

A Sustainable Golf Facility is managed by using practices that preserve limited and costly natural resources, reduce waste generation, and help prevent air, water, and soil pollution. The goal is to minimize environmental impacts and maximize value received from dollars expended.

As defined by the ISC-Audubon Sustainable Golf Advisory Council, A Sustainable Golf Facility is an economically sound business that provides safe, healthy and enjoyable environments for all employees, members, visitors, and guests. A sustainable golf facility is sited, designed, and constructed in ways that enhance the local community, and reduce or eliminate its impact on natural resources. It is managed in ways that provide balance between optimum playing conditions for golfers, and good stewardship of the natural environment. Management strategies are based upon scientifically sound site specific best practices that improve the quality of all life on the site, regionally, and beyond. Through outreach and education a sustainable golf facility is a champion and advocate of sustainability.

Striving for and ultimately achieving the Seal of Sustainability from the International Sustainability Council (ISC), and becoming Certified by Audubon Lifestyles means that the golf facility is setting the new standard for excellence. Certification coupled with the Seal of Sustainability indicates that the facility has adopted and put into place recognized Best Management Practices that equal environmental superiority, social responsibility, and economically vitality.

Golf Facilities that complete the requirements of the Sustainable Golf Facility Program become global examples of excellence not only regarding the facility itself, but in regard to the actual golfing experience.





## PLATINUM MEMBER

### Take the first Step!

Only Platinum Members can participate in the Sustainable Landscapes Programs.

As a non-profit, public interest organization, we rely exclusively on private donations, philanthropic grants, and membership dues. Your membership is put to work immediately to advance the tenets of sustainability and environmental protection, and we are deeply grateful for your support.

In addition, Platinum Membership provides a number of online resources to assist with sustainable living, and was created to help foster sustainability by working with, and providing educational resources to individuals, businesses, organizations, universities, government entities, municipalities, communities, neighborhoods, and virtually anyone seeking assistance in balancing the triple bottom line of people, profit, and planet.

Our ability to reach our organization's mission and vision depends on your participation.

#### **Platinum Membership Benefits**

- Listed on the Audubon Network for Sustainability as a Platinum Member with business logo, reciprocated link, contact information, map and address information, and business description.
- Ability to use the Platinum Member Logo on all marketing, sales and promotional, and educational materials
- New Members Packet include: ISC-Audubon Platinum Member vehicle and front door stickers and decals, computer mouse pad, co-written thank you letter from ISC-Audubon and Platinum Member Certificate for framing and display.
- Coauthored Press Release Announcing Platinum Membership distributed worldwide
- Multiple Subscriptions to SustainAbility Newsletter
- Platinum Membership is the first step in gaining Chartered ISC Member Designation and earning additional recognition by the International Sustainability Council.
- The knowledge that you are contributing to helping ISC-Audubon to continue in our mission, and receive the recognition that you are doing just a little bit more!

Please join with us today and make a positive contribution toward being socially, environmentally and economically responsible where you live, work and recreate.

Learn more about the benefits of membership by visiting:  
[www.isc-audubon.org/join.html](http://www.isc-audubon.org/join.html)

## TEN Requirements for Sustainable Golf Course Landscapes

1. Select Proper Turf and Manage it Correctly
2. Fertilize Appropriately
3. Water and Irrigate Responsibly
4. Provide Adequate and Appropriate Filtered Drainage
5. Create Water Efficient and Region Friendly Plant Beds
6. Manage Trees and Shrubs Responsibly
7. Manage Water Features Responsibly
8. Control Pests Responsibly
9. Provide Amenities for Humans & Wildlife
10. Use Technology and Innovation

Golf Course Superintendents are responsible for the irrigation, mowing, fertilization, pesticide application and general upkeep of the golf course grounds. The maintenance area is where pesticides are loaded into application equipment, mowers and other pieces of equipment are serviced, and pesticides, fuel, fertilizer, and cleaning solvents are stored. This is where pollution of soil, surface water, or ground water is most likely to occur.

Contamination can occur when pesticides are spilled, containers or equipment cleaned and the rinsewater dumped on the ground or discharged into surface water, or improperly cleaned containers are stockpiled or buried. Proper management of the maintenance area is an important part of responsible chemical and pesticide use. Poor handling and disposal practices at these sites can lead to serious environmental problems, expose the ownership to extensive legal liability for contamination and cleanup, including penalties and fines, and can create a poor public image for the golf course.

Management practices should be implemented at these maintenance areas that will prevent the contamination of soil, surface water, and ground water by the materials stored and handled at these sites, and then continued forward with the same level of responsibility applied for the management of the golf course landscapes.

### What Are the Benefits?

When landscapes require excessive amounts of water, energy, labor, and other resources, environmental and economic costs outweigh many of the natural benefits of landscapes. In contrast, a Sustainable Landscape feature healthier, longer-lived plants that rely less on chemical pesticides and fertilizers, minimize water use, and reduce waste generation and disposal. They also require less maintenance and alleviate groundwater and air pollution problems.

### Use Sustainable Practices and earn Recognition

Sustainable landscaping practices incorporate beautiful plants, shrubs, and trees and reduce maintenance costs while at the same time protect the environment. Using sustainable landscape maintenance practices also makes good business sense. Using the Sustainable Golf Course Landscapes Program as a guide will reduce resource depletion, reduce waste, and pollution problems while also improving the health of the landscape in an aesthetically pleasing and cost-effective manner.



# A Sustainable Golf Course Landscape Encourages

## **Building Healthy Soils**

Healthy soils are essential in any landscape type. Transforming poor soils into a fertile growth medium that supports healthy plant growth while reducing water use created healthy disease-and pest-resistant plants that improve the landscape appearance and increase property value.

## **Using Fertilizer Efficiently**

Applying precise amounts in a timely manner will reduce growth, diminish the potential for pollution, and promote healthy disease- and pest-resistant plants. Fertilize according to the needs of the species planted. Use slow-release or organic-based formulas based on nutrient needs as verified by soil testing. This will reduce growth spurts that increase the need for pruning and mowing.

## **Irrigating Efficiently**

Overwatering aids rapid plant growth and runoff adds to groundwater pollution. Use water-efficient irrigation systems, such as drip or low-output sprinkler heads, that deliver a precise volume of water to plant root zones. Develop watering schedules based on historical or actual weather data. Use soil probes to monitor soil moisture before watering.

## **Reusing Organic Materials On-Site**

Landscapers can use a chipper at the job site to mulch prunings and clippings from woody shrubs and trees and apply mulch on the landscape. Trimmings and clippings from lawns, trees, and shrubs from large landscape sites can become feedstock for on-site composting operations. This will save on purchasing outside soil amendments.

## **Practicing Pollution Prevention**


Landscape managers are encouraged to use Integrated Pest Management (IPM) to reduce use of chemical pesticides and herbicides. These chemicals can eventually make their way off-site and contribute to nonpoint source pollution (pollution not traceable to a single location). Increased use of non-motorized equipment will also reduce emissions and noise pollution.

## **Retrofitting Inefficient Landscapes**

As established landscape sites age or grow beyond their intended use, they must be redesigned to integrate resource efficiency, site function, and aesthetics. Reduce turf areas and establish new landscape plantings with more low-maintenance and drought-tolerant plants. Irrigation systems must undergo retrofits and depleted soils enriched to save water and promote healthy plant growth.

## **Think Recycle/Buy Recycled**

Recycling materials from the construction, installation, or upkeep of landscape sites will reduce waste. Wood waste converts to mulch, and plastic pots can be recycled into products for landscape use. Buying recycled-content landscaping products, such as plastic edging or lumber, conserves natural resources and strengthens markets for these recyclable materials.



*"The future belongs to those who understand that doing more with less is compassionate, prosperous and enduring and thus more intelligent, even competitive." - Paul Hawken, Nature Capital Institute.*



## **Frequently Asked Questions about the Sustainability Certification Workbook for Golf Course Landscapes.**

### **We don't have a landscape feature outlined in the workbook. Do we still qualify for certification?**

Yes. We recognize that each golf course landscape is unique and that not all landscapes will have the 10 Criteria Sections outlined in the workbook. If the golf course landscape seeking Certification does not have a certain feature then simply make a note of that for our reviewers, and move on to the next section.

For example, #7 in this workbook states "Manage Water Features Responsibly". However if no water features (ponds, lakes, Streams etc.) are present on the site, then simply skip that section., and you have met the requirements for that section.

### **In each of the Ten Criteria Sections there are sub sections. Are those the requirements? If not what are those?**

The text listed on each page of the Criteria Sections is intended to be educational in nature, and not viewed specially as the requirements for certification. It is not a requirement that a landscape do each and every suggested management practice outlined in the text in this workbook. Under each one of the Ten Criteria Sections are methods, and management practices upon which a landscape may meet that criteria, and should be viewed as opportunities upon which to meet certification.

For example, on Criteria Section #9 titled "Provide Amenities for Humans and Wildlife"; one of the suggested items outlined in that section is to "Provide for Birds", and under which describes ways upon which one might be able to provide for birds. Specifically, "Providing for Birds" is not the requirement that must be met in order to meet certification requirement for that section, but "Providing for Humans and Wildlife" is.

In other words, if you installed bat houses, or created a butterfly garden, or provided habitat specific to reptiles and amphibians (other kinds of non-bird wildlife), then that would meet the requirements of that section even though those forms of wildlife are not specifically listed in the text of that section.

### **What specifically is required for Certification?**

In order to earn Certification and the Seal of Sustainability, ISC-Audubon must feel confident that certain items have been achieved and that the overall objectives for each section have been met. At the bottom of each section is a list of required verification items under the heading "What is Required for Certification". Each of the items listed under each section should be submitted to ISC-Audubon for review.

Additionally, the following items are required for certification:

- The Golf Facility applying for certification is only available to Platinum Members.
- A completed Natural Resource and Golf Facility Survey must be included with the submittals for certification
- Completed the Golf Facility Checklist
- All Verification Requirements in this Workbook must be met and submitted to ISC-Audubon
- A map of the site with all of the requested features depicted must be submitted for review. A map can be hand drawn, or digitized, or a combination of both.

### **Is there recertification process?**

Golf Facilities must resubmit the Golf Facility Checklist, and the Natural Resources and Golf Facility Survey every three years.

# Select Proper Turf and Manage it Correctly

*Offers: Water Conservation, Financial Savings, Aesthetic Value*

Selection of grass species is based on site conditions, expected usage, and maintenance standards.

Turf provides a forgiving and resilient surface for many recreational activities, and is the traditional “green carpet” visitors associate with parks, lawns, and common areas. Because turf varies substantially in use, so do turf management practices.

When considering a landscape's water requirement, it is important to note that turf grasses require more frequent watering and maintenance than most other landscape plants. Carefully select grass according to its intended use, planting location and maintenance requirements.

Also, when designing or evaluating turfgrass areas in the landscape, consider the ease or difficulty in watering the proposed area. Long narrow areas and small odd-shaped areas are difficult for any irrigation equipment to efficiently water, and require more time to maintain. Try to eliminate long, narrow areas and maintain more blocky, square areas.



## **Mowing**

Frequency - The importance of regular mowing to promote healthy turf cannot be over-emphasized. Growth should be monitored and frequency increased to avoid removing more than 1/3 of the leaf blade. Mowing grass at the proper height conserves water. Applying fertilizer to the lawn at the proper time and in the proper amount can save time, effort and money through reduced mowing and watering.

Mulch Mowing - Grass clippings should rarely be removed from mowed turf areas. The plant nutrients and organic material they contain play an important role in developing a healthy, productive environment for root growth.

- Mowing patterns should be alternated to avoid ruts and compaction from the wheels.
- Avoid driving on frozen turf.
- Avoid driving on wet ground where ruts will remain. Walk the site during wet conditions to do a visual inspection.
- Mowing equipment should be maintained regularly, especially sharpening and adjusting of cutting edges.
- Ensure that grass clippings do not have the potential to be washed into stream or drainage systems, which can degrade water quality.

## **Over-seeding**

- Heavily impacted areas should be over-seeded at least once per year.
- Remove leaves and debris from turf prior to over-seeding.
- Keep leaves and debris off turf, as much as possible, after over-seeding to promote successful germination of grass seed.

## **Steep Slopes**

Mowing and maintaining turf on steep slopes can be hazardous. Whenever possible, low growing shrubs or ground covers should be planted on steep slopes. This will greatly reduce maintenance needs and increase erosion control. If turf is ever required on a steep slope, the following management practices should be followed:

- Grass growth should be controlled mechanically with string trimmers.
- Consider leaving un-mown or mowing only 1 or 2 times per year.
- Consider replacement of existing turf with low growing shrubs or groundcovers.

## Edging

Edging by either manual or chemical methods control plant growth both in the lawn surrounding a bed and plant material in the beds. The main purpose is to maintain a neat edge to the planted area, but also control weeds in the bed edge.

- Edging should be performed a minimum of 2 to 4 times per year, depending on the maintenance standard for the site. Turf edging is done to give a finished look to lawn areas that border paved surfaces or planting areas.
- At high visibility locations, edging should be performed more frequently.
- Edging should be performed with metal bladed equipment, whenever possible, to prevent damaging turf edges.

## Creating No-Mow Areas in the Landscape

No mow zones are defined as areas that are allowed to grow undisturbed. These no mow zones provide improved biodiversity, enhanced riparian habitat, improved dissolved oxygen levels, and increase bank stability in areas along streams, and water bodies, and help to improve water quality.

By allowing these areas to remain undisturbed we allow a greater variety of native vegetation to re-establish itself, including both overstory plants (the uppermost layer of foliage that forms a forest canopy) and understory plants (the underlying layer of vegetation, especially the plants that grow beneath a forest's canopy). At the same time this method of regeneration helps conserve moisture in the soil.

## Grasscycling

Grasscycling is the natural recycling of grass by leaving clippings on the lawn when mowing. Grass clippings will quickly decompose, returning valuable nutrients to the soil.

Grasscycling saves time, money, and protects the environment. Mowing time is reduced since the bagging and disposal of clippings is eliminated. Grass clippings add beneficial organic matter to the soil, which provides free fertilizer and produces healthy, green lawns. Grasscycling reduces turf grass fertilizer and water requirements, which can minimize toxic runoff entering storm drains and polluting lakes, creeks, and rivers.

Grasscycling also reduces the amount of yard waste disposed in landfills. Research has shown that lawns can generate approximately 300 pounds of grass clippings per 1000 square feet annually. This can be as much as 6 1/2 tons per acre each year! Grass clippings are too valuable to throw away, and grasscycling allows this green material to be reused in our landscapes.

## Trimming

- Trimming should be performed by walk behind mowers and line trimmers in areas that cannot be accessed by riding mowers.
- Trimming should be coordinated to coincide with other mowing activities on the site.



## What's Required for Certification?

*please provide the following*

- List of Turf Types Used
- Completed Natural Resources and Landscape Survey
- One Example Photo of the Core Turf Area of the Landscape

# Fertilize Appropriately

*Offers: Soil Health, Plant Health, Water Quality Protection*

Landscape plants, like all living things, need nutrients to survive. Many of the elements that are essential for a healthy landscape are already in the soil, but fertilization is often needed to supplement these nutrients. When nutrients are added, care must be taken to apply only what the plants will use. Too much fertilizer can damage plants, impair water quality, and wastes money.

You do not, however, have to choose between having a healthy, attractive landscape and protecting water quality. Knowing how to determine proper nutrient applications for your landscape is the key. Soil properties, types of nutrients, plant needs, fertilizer types, application methods, and application timing need to be considered.

## It Starts with the Soil

Soil is the basis for plant growth. The characteristics of the soil determine how well the plants are able to use nutrients. Before planting, learn about your soil. This involves soil testing and understanding how to adjust soil properties.

A soil test indicates what nutrients are in the soil and what nutrients are needed. In nearly every state, soil tests are provided for free or for a small fee. A soil analysis should list the amount of nutrients in your soil and gives recommendations for improving the nutrients for landscape plants. After the initial soil test, you should analyze your soil every three to five years to make sure that your fertilizer program is on target.



## Soil Properties

The effectiveness of fertilizer applications depends on soil properties such as texture, organic matter content, drainage, and pH.

Soil particles are grouped by size and designated as sand, silt, or clay. Sand is the largest particle size, and clay is the smallest. Soils contain different proportions of sand, silt, and clay that make up the soils' specific texture. In general, soil textures with a greater portion of silt and clay retain more water and nutrients than those soils composed mostly of sand particles.

Soil organic matter also influences soil productivity. In general, organic matter increases both the water and nutrient holding capacity of a soil. Organic matter additions to soil may also provide nutrients as they decompose or increase the health of the soil by amending or modifying the soil structure to promote water infiltration and root penetration.

Soil pH, a measure of acidity, has a significant impact on the plant's ability to use nutrients. The scale of pH goes from 0 to 14. Seven is considered neutral; values below 7 are considered acidic, and values above 7 are considered alkaline. If the soil is too acidic (low pH), the pH can be raised by adding lime. If the soil is too alkaline (high pH), the pH can be lowered by adding sulfur.

## Increase the Soils Ability to Hold Moisture

Plant foods and soil conditioners which contain a natural mix of nutrients, enzymes, vitamins, minerals and natural stimulants and soil conditioning agents help soil retain water and hold on to its moisture.

- Sandy soil has the largest particles and feels gritty. This soil is loose, drains easily and dries out fast.
- Clay soil has the smallest particles. It feels smooth like flour and holds together like Silly Putty. When wet, this soil is heavy, sticky and often soggy. In winter, it can get waterlogged, causing some plants to rot. In summer, it can be hard to dig into. Clay soil holds onto nutrients and water better than sandy soil.
- Loamy soil is a mix of sand, silt, clay and organic matter (decomposed plants, compost or manure). This soil is usually loose, drains well and holds onto moisture and nutrients.

## Fertilizers

The analysis, or grade, of a fertilizer refers to the minimum amounts of nitrogen (N), phosphorus (in the form P<sub>2</sub>O<sub>5</sub>), and potassium (in the form K<sub>2</sub>O) in the fertilizer. The analysis is always printed on the fertilizer label. A fertilizer with a 10-10-10 analysis contains 10 percent nitrogen, 10 percent phosphorus, and 10 percent potassium. For example, in 100 pounds of 4-8-12, there are 4 pounds of nitrogen, 8 pounds of phosphorus, and 12 pounds of potassium.

Fertilizers may be divided into two broad categories, natural and synthetic. Natural fertilizers generally originate from unprocessed organism sources such as plants or animals. Synthetic fertilizers are man-made or processed. Synthetic fertilizers can be organic (for example, urea) or inorganic (for example, superphosphate).

Natural fertilizers commonly misnamed "organic" can also contain inorganic ores such as rock phosphate. Most nutrients from living or once-living organisms are not readily available for plant growth because they are bound in organic molecules such as proteins and amino acids and in structures such as cell walls. These nutrients are released only by microorganisms decomposing the organic matter.



Slow-release fertilizers may be synthetic or natural. Because nutrients are released over an extended period of time, slow-release fertilizers do not have to be applied as frequently as other fertilizer types. Also, higher amounts of slow-release fertilizer can be added at each application without risking injury to plant roots. Slowly released nitrogen is used more efficiently because a higher percentage is absorbed by plants. The higher efficiency of slow-release fertilizers means less nitrogen is available to contribute to pollution of streams and subsurface water. The primary disadvantage of slow-release fertilizers is higher cost. When an analysis is done to determine the cost of nitrogen that is actually absorbed by the plant, however, the unit cost is actually less for slow-release materials. Several categories of slow-release nitrogen fertilizers are available in garden centers. Water-soluble or liquid fertilizers are applied either to the soil or foliage. Many water-soluble formulations are available for almost any specific need, from plant starter, high-nitrogen fertilizers to minor element formulations.

The following are guidelines for nitrogen application as it relates to the stage of plant growth:

- At planting time, nitrogen needs are relatively low, but sufficient nitrogen should be supplied to support the new root generation and top growth of the plant. High rates should be avoided because they will trigger excessive top growth that cannot be supported by a limited root system.
- Maximum growth of landscape plants is usually desired during the first few growing seasons after establishment. To achieve maximum growth, constant rates of nitrogen are needed.
- As the plant begins to mature and the rapid growth rate is no longer needed or desired, lower levels of nitrogen are sufficient to maintain plant vigor.
- Plants growing in a restricted root zone should not receive large amounts of nitrogen, because restricted roots cannot support excessive top growth.
- Some plants, once established, may not need additional fertilizer to perform well. Silver maple, willow, ligustrum, and forsythia are good examples. Because of fibrous root systems, some ornamentals, like azalea, dogwood, hemlock, and rhododendron, are easily damaged by fertilizers. Split applications of water-soluble nutrients or slow-release formulations are recommended for these plants.

## What's Required for Certification?

*please provide the following*

- Copy of Soil Test Results
- List of Fertilizer Products Used
- Fertilizer Application Rates and Schedule

# Water and Irrigate Responsibly

*Offers: Water Conservation, Energy Efficiency, Financial Savings*

Of the tremendous amounts of water applied to lawns and gardens, much of it is never absorbed by the plants and put to use. Some water is lost to runoff by being applied too rapidly, and some water evaporates from exposed, unmulched soil; but, the greatest waste of water is applying too much too often. In addition to over watering plants, excess irrigation can leach nutrients deep into the soil away from plant roots, increasing the chances of polluting groundwater. Similarly, runoff caused by excess irrigation can carry polluting fertilizers and pesticides to streams and lakes. The waste or pollution of high quality water through inefficient irrigation practices can be eliminated through proper watering techniques.

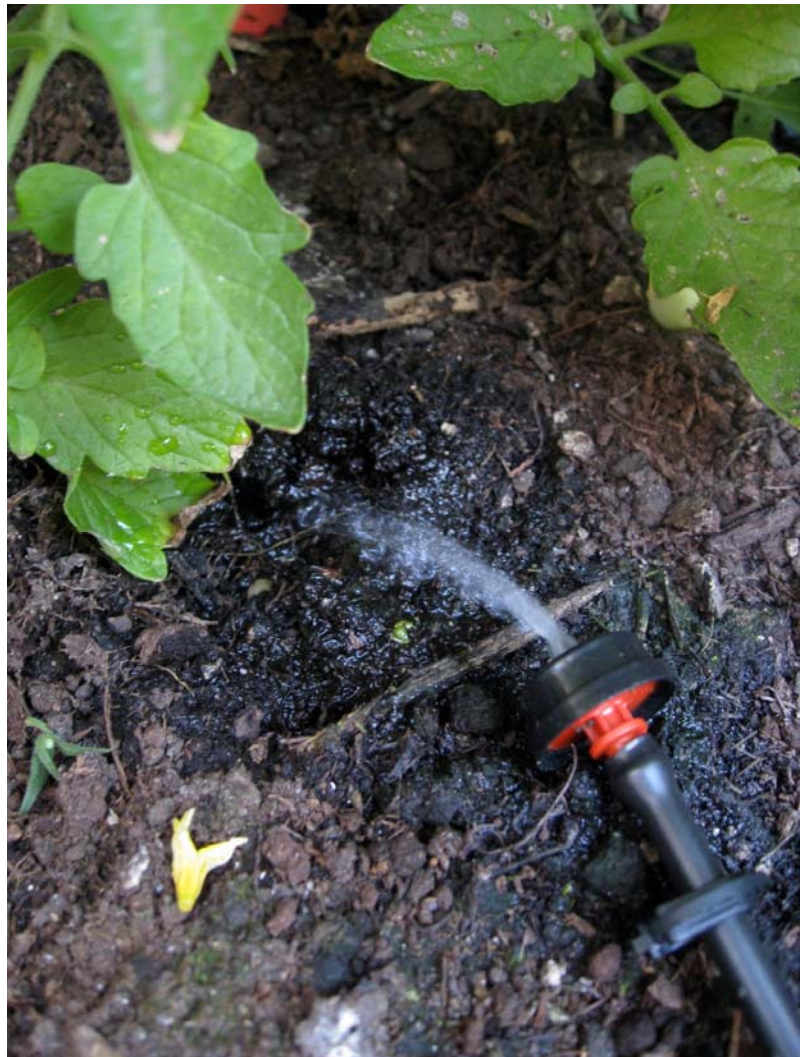
Most lawns receive twice as much water as they require for a healthy appearance. The key to watering lawns is to apply the water infrequently, yet thoroughly. This creates a deep, well-rooted lawn that efficiently uses water stored in the soil. To know when to water the lawn, simply observe the grass. Wilting and discoloration are signs of water stress. At the first sign of wilting, you have 24 to 48 hours to water before serious injury occurs. Apply 1 inch of water to the lawn as rapidly as possible without runoff. Watering only when needed and watering thoroughly produces a deep-rooted lawn that is more water efficient and drought enduring.

## Irrigation Systems

The goal of any irrigation system is to give plants a sufficient amount of water without waste. By zoning an irrigation system, grass areas can be watered separately and more frequently than groundcovers, shrubs and trees. Both sprinkler and drip irrigation can be incorporated to achieve water conservation in a landscape.

Sprinkler Irrigation: Sprinkler irrigation is the most commonly used method of landscape watering. The two most common types of sprinkler irrigation systems are the hose-end sprinkler and the permanent underground system. Even though a permanent sprinkler system can be more water efficient than a hose-end sprinkler, both systems require little maintenance and apply large volumes of water in a short time. A properly adjusted sprinkler head sprays large droplets of water instead of a fog of fine mist which is more susceptible to evaporation and wind drift. With either hose-end sprinklers or permanent systems, water between late evening and mid-morning to avoid excessive waste through evaporation.

Drip Irrigation: Drip irrigation offers increased watering efficiency and plant performance when compared to sprinkler irrigation. Drip irrigation slowly applies water to soil. The water flows under low pressure through emitters, bubblers or spray heads placed at each plant. Water applied by drip irrigation has little chance of waste through evaporation or runoff. Seeking professional irrigation advice and experimenting with available drip irrigation products in small sections of the landscape are the best ways to become familiar with the many benefits of this watering technique.



## Water Use Zones

Divide the landscape into three water-use zones: high, moderate, and low. High water-use zones are highly visible areas of the landscape, such as the entrance to the property or building. In these zones, plants are irrigated as needed to promote optimum growth and aesthetic appearance.

Moderate water-use zones are transition zones, bridging the high and low water-use zones. In these areas, established plants are watered only when they show signs of moisture stress. Low water-use zones are low impact areas or background areas viewed from a distance. Beds of mulch or drought tolerant plants would be used in low water-use zones because they are not irrigated once established.

Irrigation design is the foundation of sound water management. The design process involves determining which sites to irrigate, what portions of each site should be irrigated, and choosing the appropriate irrigation system.

## Best Management Practices for Irrigation Systems

Best management practices for irrigation systems combine activities for maximizing a range of technologies for water control and common field practices.



- Water use needs of the turf, shrubs, and trees should be researched prior to irrigation. Apply no more water each week than required to sustain healthy plants. For turf areas, a general rule of thumb is no more than 1 inch of irrigation water per week, including rainwater.
- Turf should be watered 1 – 3 times per week, and for longer periods to promote deep rooting. Deep rooting leads to healthier, more drought-tolerant grass.
- Soil plays an important role in irrigation. Soil conditions should be considered, particularly in turf areas with heavy use. Heavier, clay-type soils cannot be watered as long during each watering cycle as can sandy soils.
- Turf and planted areas should be aerated and cultivated to relieve soil compaction and increase water uptake.
- Wherever possible, watering should be avoided during the hottest part of the day. Watering at night is preferred to reduce evaporation of water as well as possible vandalism to equipment and irrigation heads.
- Special attention should be paid to verify that manually operated sprinklers are actually watering the landscape and not streets or other non-landscape areas such as lakes and ponds.
- A water budget should be determined for each site.
- A complete system audit should be completed on a 5-year cycle.
- Application of irrigation water should be carefully monitored to determine when controller settings can be reduced to save water and to reduce runoff.
- A resource management system for irrigation operations should be developed. This system would provide a database from which programming records can be retrieved for annual system reprogramming to avoid starting from scratch.

## What's Required for Certification?

*please provide the following*

- One Photograph of Irrigation in Action
- One Photograph and Description of Irrigation System
- Location of Sprinkler Heads with Spray Zones Depicted on Map

## Provide Adequate and Appropriate Filtered Drainage

*Offers: Water Quality Protection, Erosion Control*

Soil drainage is critical to plant health. The soil's ability to hold water must be balanced with its ability to retain enough oxygen for plant growth. If soil becomes saturated for a prolonged period of time, the oxygen trapped in soil pore space can be rapidly depleted by the plant and soil organisms. When roots cannot get oxygen, the plant's ability to get nutrients and grow is impaired. Poor drainage causes more problems for landscape plants than any other factor.

The amount of water in the soil can either be a problem or an asset in terms of plant survival. Determining the movement of water across the site surface and into the ground is critical to plant selection. For instance, dry areas may benefit from water redirected from sidewalks, gutters, or foundation drains during rain, but using drought tolerant plants in dry areas may be the best solution.

If poor soil drainage is the problem, make corrections prior to planting. Soil drainage is determined by topography, soil texture, and the presence of sub-surface hardpans. Removing and replacing the existing soil is often tried; this often proves unsuccessful because quality topsoil is hard to find, and the interface of the new and existing soil is critical to drainage. Depending on soil texture, amending a native soil with too little sand can actually reduce the soil drainage.

Mounding soil to create raised beds improves soil drainage, but if the drainage problem is caused by topography, a raised bed may not work. Any time new soil is added, take care to mix the two soils together to prevent drainage problems caused by layering effects. If a hard pan is causing the problem, using a piece of machinery to break up the impermeable layer will improve drainage. French drains, subsurface drainage systems, or other engineered systems are often required to correct drainage problems. These practices can be incorporated into the design by means of a false creek bed or gravel walk, but they can add considerable expense to a landscape project. It is easier and cheaper to select plants adapted to specific drainage situations than to remedy serious drainage problems.

Understanding how your soil drains is critical to choosing the right plants and knowing how to water them. If soil drains too quickly, plants may not have a chance to absorb enough moisture, so you will need to water more often. And if soil drains too slowly, plants may actually suffocate or rot, especially during our wet winters.

### **Buffer zones**

Buffers can be tremendously effective in reducing the runoff of nutrients, sediments and pesticides. They control water erosion and reduce the amount of soil lost to wind erosion during periods of strong winds. Conservation buffers trap sediment, bacteria, fertilizers, pesticides, viral pathogens and other possible contaminants, minimizing the chances of these potential pollutants reaching surface and ground water sources. This allows buffers to slow water runoff and enhance water infiltration, thus improving overall stream and water quality. Conservation buffers help stabilize a stream and reduce its likelihood of downstream flooding.

In addition to slowing runoff, buffers create havens for many different types of wildlife. For example, shady areas of a stream created by buffers can reduce sunlight intensity, lower water temperature and increase fish population. In addition, buffers provide excellent food sources, nesting cover and shelter for many wildlife species. They also provide connecting corridors that enable wildlife to move safely from one habitat area to another and protect wildlife from harsh weather conditions. As a result of installing a conservation buffer, fish spawning rates can improve, allowing for increased species diversity in a particular area. The diversity of native vegetation also increases.





## Stormwater Management

When a rainfall event occurs, several things can happen to the precipitation. Some of the precipitation infiltrates into the soil surface, some is taken up by plants, and some is evaporated into the atmosphere. Stormwater is the rest of the precipitation that runs off land surfaces and impervious areas.

Stormwater discharges are generated by precipitation and runoff from land, pavements, building rooftops and other surfaces. Impervious surfaces do not allow rainfall to infiltrate into the soil surface like natural vegetation, and creates a much more concentrated volume of stormwater runoff. Storm water runoff accumulates pollutants such as oil and grease, chemicals, nutrients, metals, and bacteria as it travels across land. Heavy precipitation or snowmelt can also cause sewer overflows that may contaminate water sources with untreated human and industrial waste, toxic materials, and other debris.

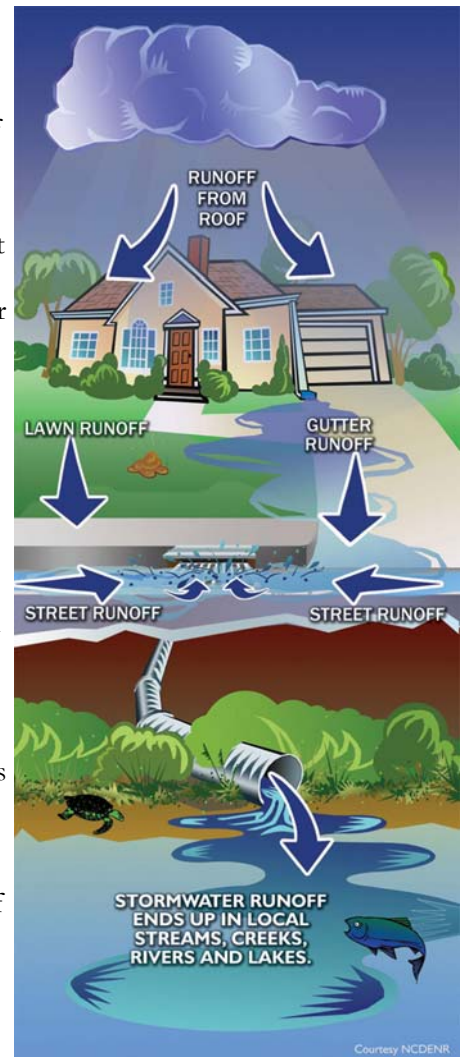
Stormwater runoff can have a number of impacts. As development and imperviousness increase in an area, the natural capacity of the soil and vegetation to infiltrate and take up rainfall decreases, and more rainfall becomes stormwater runoff. This can produce negative impacts by causing erosion of land areas and stream banks, by causing or increasing flooding and also by carrying pollutants to surface waters. When more houses, roads and businesses are constructed, water has nowhere to go and can cause serious drainage, pollutant, and sanitation problems.

Stormwater runoff may be carried through natural or manmade drainage ways or conveyance systems. In some cases stormwater runoff leaves a site spread out over a large dispersed area as “sheet flow.” It may also be conveyed through natural ditches, swales and natural drainage features. In most developing and urbanizing areas, stormwater is conveyed through a system of catch basins and pipes commonly referred to as a storm sewer system.

## Steep Slopes

Steep slopes are defined as any slope over 40%, and are considered sensitive, or critical areas. The surface slope, soil layers and ground water layers all can impact how stable a slope is. To minimize impacts to a slope and the surrounding area:

- Removing vegetation from the ground layer should be minimized, and plantings should be stabilized with appropriate bioengineering techniques (e.g. netting, wattling, hydro-mulching, etc.).
- Revegetation should be evaluated so as not to cause more damage or disturbance to soil layers.
- Slide areas, or areas suspected of being slide-prone, should be evaluated by a geotechnical expert before extensive restoration begins.
- Storm-water runoff must be prevented from saturating or loading steep slopes. The appropriate drainage system should be in place and adequately maintained to intercept runoff flows before reaching the slope.



## What's Required for Certification?

*please provide the following*

- One Example photograph of Filtering Methods Either at inflow or outflow. (day lighting, rain garden, buffers, etc.)
- All Onsite Drain Locations, and Outflows Indicated on a Map

# Create Water Efficient and Region Friendly Plant Beds

*Offers: Water Conservation, Financial Savings, Pest Resistance, Biological Diversity*

Select trees, shrubs and groundcovers based on their adaptability to your region's soil and climate. These plant types have lower water demands, fewer pest problems and less fertilizer needs than many non-adapted, exotic plants.

When you match the right plants to the right environment, your plants grow stronger roots and are healthier, which in turn requires less watering, reduces or eliminates the need for pesticides, and makes plants more resilient to disease and harsh weather.

Do you have primarily sun or shade? Light can vary greatly depending on the time of day, the season and whether it is filtered or completely blocked.

- Sunny areas get six or more hours of full sun, resulting in warm, dry soil. If plants are also exposed to wind, they will lose even more moisture.
- Shady areas are under trees or eaves or against north-facing walls. Moreover, these areas can be especially dry if tree roots are competing for moisture or when eaves block rainfall year round.

## **Choose the right plants and group them together.**

Once you know the sun, shade, soil and drainage conditions of your yard, you can choose the right plants. When making a final plant selection, list the plants and group them according to irrigation needs. Look for alternatives when moisture requiring plants are specified for non-irrigated areas. Understanding the individual needs and tolerances of plants will help in selecting and grouping plants in the landscape.

Grouping plants with similar water requirements in the landscape allows more precise irrigation design and water management. All plants require a certain amount of water to grow to maturity.

## **Water until established**

Plants take one to three years to develop sufficient roots to thrive on their own. Even “drought tolerant” or “native” plants need summer water the first few years. Some plants will still need occasional water after three years during our driest months.

When landscapes are designed and installed without regard to site conditions or water conservation practices, problems can occur. Some plants may require frequent watering to survive, while others are over-watered. When this happens, it may be necessary to relocate some plants and replace others. Most landscape plants can be successfully transplanted when they are dormant. If plants are too large to move, they may have to be left in place to fend for themselves or removed if they become unattractive. Unattractive plants can be cut down to the ground and treated with an herbicide to prevent resprouting, and a more appropriate plant can be placed in its spot.

## **Plant Beds Management**

Landscape plant beds are often the focal point of a park, streetscape or community building. They provide color, texture, space definition, fragrance, wildlife habitat and other benefits enjoyed by residents and guests.

Level of visibility and site use dictate maintenance standards for plant beds. Even within the same landscape area, maintenance techniques can differ for formal plantings and high-traffic areas as opposed to remote areas that may remain informal and natural. For that reason, plant bed management practices are tailored to the specific requirements of plant material and site goals. At a formal site, the desired result may be to promote prolonged bloom in floral displays.

## **Mulching**

Mulching serves to conserve moisture, retain soil, suppress weed growth, moderate soil temperature, reduce compaction, and supply nutrients for plants and soil microbes. It is also aesthetically pleasing, making it desirable for high visibility locations.

To increase plant health and conserve water, add organic matter to the soil of shrub and flowerbed areas. This increases the soil's ability to absorb and store water in a form available to the plant. As a rule-of-thumb, till in 4 to 6 inches of organic material such as shredded pine bark, peat and rice hulls.

### **Concentrate Seasonal Colors**

Most annuals used in seasonal color displays are shallow-rooted plants and have high water requirements. Showy color beds have become a common practice in today's landscape. They draw attention, and add excitement and visual interest into the landscape. The vivid color, not the size, of the planting attracts attention. Concentrating color in small, highly visible areas saves water, time, and money. Bold colors such as red and orange help smaller flower beds attract attention. Perennial plants, flowering shrubs, or shrubs with colorful foliage can be used in or around a flower bed to add height and depth to a small planting. Herbaceous perennials and shrubs tend to have more extensive root systems than annuals, are less costly to maintain, and are more water efficient than shallow-rooted annuals.

Locate flower beds where they will provide the greatest impact yet be close to available water sources. Another alternative to large in-ground flower beds is to use large containers placed in high impact locations. By using containers large enough for adequate root growth and by carefully selecting plants for container conditions, high-impact color can be achieved that requires less water than in-ground beds.

### **Plant Density**

Densely planted shrubs are not only unattractive but require more water and maintenance. Densely planted shrubs encourage moisture-related problems around foundations and crawl spaces by reducing air flow. Overcrowding also increases the water requirements of plants since they compete for available moisture. Additionally, the dense canopies are havens for insects and diseases. The foundation of a building, with its "green necklace" of plants wrapped around it, is the most commonly overplanted area.

Space plants according to their mature size to reduce competition for water. Many times individuals insist upon having an "instant landscape" and space plants closer than their mature size indicates. Changes to the landscape plan are often made during installation because smaller plants just "look too far apart."

### **Native Plants**

Using native plants to restore the landscape or as a substitute for exotic ornamental plantings can help to reverse the trend of species loss. Although the methods may differ, native plants require the same level of care in installation and establishment as do ornamental plants. If the environment has been altered significantly through human activities, some work will be necessary to recreate an environment more hospitable to natives. However, in the long run, natives will, in most cases, form self-sustaining plant communities that do not require much maintenance. Because they are adapted to a local region, they tend to resist damage from freezing, drought, common diseases, and herbivores if planted in that same local region.

Advantages of native plants:

- add beauty to the landscape and preserve our natural heritage
- provide food and habitat for native wildlife
- decrease the amount of water needed for landscape maintenance
- require very little long-term maintenance if they are properly planted and established
- produce long root systems to hold soil in place protect water quality by controlling soil erosion and moderating floods and droughts

## **What's Required for Certification?**

*please provide the following*

- List of Vegetation Used in Plant Beds
- One Example Photo of Plant Bed in Landscape

# Manage Trees and Shrubs Responsibly

*Offers: Water Conservation, Plant Health, Human Safety, Air Quality*

Trees and shrubs are an integral component of this stormwater system and must grow well in order to realize maximum stormwater mitigation. By enlarging the rooting volume typically available to trees in paved areas, canopy size has the potential to increase faster and trees may ultimately reach a greater size. Rainfall interception, storage, and ultimately evapotranspiration from leaf surfaces, are directly related to canopy size. In addition, rainfall captured by tree canopies is often directed down limbs and trunks into the soil at the base of the tree—effectively bypassing the pavement.

Whenever possible, preserve native vegetation and avoid disturbing it. Established vegetation growing on a site has an extensive root system and requires less irrigation water than newly planted trees and shrubs. Well-established root systems have already adapted to the moisture extremes of the region. Mature trees also provide immediate shade that would take many years for newly planted trees to provide. It is important to identify valuable plants prior to site work and to install protective barriers to preserve the native vegetation, which can later be incorporated into a new landscape design.

## Tree Pruning

Pruning is sometimes necessary for young trees. Branches that grow into a right-of-way or too close to power-lines can be very dangerous. Usually, branches that grow below 8 feet above a sidewalk or below 14 feet above a street should be cut back. Dead branches should be pruned to restore vigor to a tree.

Learning the proper method for tree pruning is important as you can seriously wound or even kill a tree. The best time to prune living branches is late in the dormant season or very early in spring before leaves form. Dead and dying branches can be pruned anytime. Use clean sharp tools and make clean cuts.

Pruning should be performed for the following reasons:

- Encouraging and directing new growth and flowering
- Removing spent blooms and foliage
- Removing insect, disease, and weather damage
- Maintaining size and shape
- Maintaining visibility
- Improving safety
- Creating pedestrian and mower access.

## Selecting New Trees

Each tree or shrub species has climatic and physiographic limitations. Within these parameters, a tree or shrub may be well or poorly adapted because of soil characteristics. Additionally, some introduced species may pose a problem because of spreading (by seed or root suckering) or displacing native species.

Selecting trees for a landscape that adapt well to their site and fulfill their landscape function is extremely important to the success and maintenance of a planting. The quality of young plants is also crucial. A plant species should be selected on the basis of its functional uses, its adaptation to the site, and the amount of care it will require.

Landscape Functions - There are four main functions to consider when selecting trees to include in the landscape design.

- Architectural features: privacy, view enhancement, and space articulation
- Engineering: reduce glare, direct traffic, filter air, reduce soil erosion, and attenuate noise
- Climatic influences: transpirational cooling; interception of solar radiation, reflection, and re-radiation; and modification of rain, fog and snow deposition
- Aesthetic uses: form, color, and texture.

Site Adaptation - *It is important to plant the right tree in the right place.* The intended landscape use and nature of a site should be considered when selecting for growth habit and ultimate size. Mature size is an important consideration. The tree should not outgrow its allotted space given such constraints as vistas and power-lines.

## Planting New Trees and Shrubs in the Landscape

Planting holes should never be dug when the soil is saturated with water. Side walls of a hole dug in a clay soil become glazed just like a ceramic pot. This smooth side wall prevents roots from going out of the planting hole. Eventually the plant becomes pot bound and declines.

The planting hole should be two to three times the diameter of the soil ball or spread of the roots in the case of bare root plants. The poorer the soil and the more difficult it is to dig the hole, the wider the planting hole should be. The depth of the planting hole should be equal to the height of the soil ball. Measure the depth of the hole carefully against the height of the soil ball. It is easier to double check the measurement than to lift a heavy plant out of the hole so that it can be dug deeper or filled.

The most important rule is that the root system should be the same depth as it was previously growing in the nursery. If the newly transplanted tree or shrub is too deep, feeder roots die because of lack of oxygen and the trunk begins to decay. If it is planted too high, the upper part of the root system will dry out and roots die. Decay also occurs when graft unions are buried. Decay organisms that attack the graft union or trunk result in a plant that is stunted, begins to decline and eventually dies.

## Establish New Trees

All trees and shrubs need more frequent watering from planting time until becoming well rooted, which may take two growing seasons. Once established, plants can then be weaned to tolerate less frequent watering. Proper weaning develops deep roots and makes the plants more drought enduring. As with lawns, water established trees, shrubs and groundcovers infrequently, yet thoroughly. In the absence of rain, most trees and shrubs benefit from a once-a-month thorough watering during the growing season. Remember, normal lawn watering is not a substitute for thorough tree and shrub watering. The feeding root system of a tree or shrub is located within the top 12 inches of the soil and at the "dripline" of the plant. The dripline is the area directly below the outermost reaches of the branches. Apply water and fertilizer just inside and a little beyond the dripline, not at the trunk. Simply lay a slowly running hose on the ground and move it around the dripline as each area becomes saturated to a depth of 8 to 10 inches. For large trees, this watering technique may take several hours.



## Protecting Tree from Damage

The greatest single cause of damage to young trees in the landscape comes from lawn equipment. Mowers and string trimmers damage bark on trunks they contact. Wounding reduces the flow of sugars from leaves to roots and is an excellent site for entry of insects and microorganisms.

- Control weeds after planting. You can kill weeds by mulching around seedlings with, wood chips, bark, or composted leaves. Be sure to make the mulch layer about 6 in. thick to keep weeds from reappearing.
- Apply herbicides, but only when needed, in the proper amount at the right time. Two types of herbicides are effective in controlling grasses and broadleaf weeds. Check with your county agricultural extension service for information on recommended chemical weed control around tree plantings.

## What's Required for Certification?

*please provide the following*

- List of Trees and Shrubs located in Landscape

# Manage Water Features Responsibly

*Offers: Water Conservation, Erosion Control, Biological Diversity, Wildlife Conservation*

## **Aquatic Plant/Algae Management**

Management of aquatic plants and algae is perhaps the most common issue that pond owners face. There are three types of aquatic plants; submerged, emergent, and floating. The algae is a type of its own, and comes in many forms, from the single cellular to long filamentous strands. There are many species of aquatic plant and, each species requires its own individual management plan.

There are four different management strategies for aquatic plants and algae. The first is physical management. Physical management includes pulling, cutting, burning, freezing, drawing down, or any other method of a person physically managing the problem. The second is mechanical management. Mechanical management is the use of some kind of machinery such as a mower, mechanical harvester, etc., to cut or remove the plant or algae material. The third method is chemical management. Chemical management is the use of a chemical or herbicide to control aquatic plant/algae growth or development. A permit should be obtained before treating water with a chemical control. The fourth method is biological management. This management strategy involves the introduction of a plant, animal, fish, or insect species that feeds or competes with the aquatic plants or algae. A prime example are grass carp. These fish eat certain types of aquatic plants, and thus keep these species of plants from becoming a management problem in the future.

Each management method has positive and negative sides, and no one is always better than the other. The type and species of the plant or algae will determine which method should or can be used for control. It is crucial to correctly identify the species of aquatic plant or algae that you are seeking to control, before beginning any type of management.

## **Pond Water Quality**

The quality of the water in a pond is the basis to the success or failure of your pond. Just as the chemical, physical and biological properties of drinking water can create problems, the same properties create management issues in your pond as well. Dissolved Oxygen, pH, Nitrate/Ammonia, phosphorus, alkalinity, turbidity, and temperature are all important to your ponds health.

Testing your ponds water quality can be done yourself, or by a laboratory. Water quality test kits for ponds are available from some specialty landscape/horticulture dealers, scientific catalogs, or educational material suppliers.

## **The Benefits of Submerged and Emergent Vegetation**

Aquatic plants are not considered desirable by many pond owners as they are viewed as a nuisance to such pond activities as swimming and fishing. However, all aquatic plants should not be viewed as undesirable, given the benefits they can provide. Many plants are critical to fish and wildlife communities associated with ponds because they provide cover, nesting areas, and food.

Ultimately, whether a plant provides a benefit or is considered a nuisance rests entirely with the pond owner and his/her goals for the pond. For example, a pond owner who desires a high-quality swimming pond often views any aquatic plant as undesirable and may go to great expense to eliminate these plants. Conversely, a pond successfully managed for wildlife will have a variety of aquatic plants present with only a few plant species being considered a nuisance.

Submerged and emergent plants are critical to a well-structured fish assemblage. They not only provide protection for small fish from predators but also produce large numbers of invertebrates for small fish, such as bluegill, to eat. Submerged and emergent plants also are an important food source for many species of waterfowl in the form of vegetation-dwelling invertebrates or the plants themselves. Notable duck species associated with submerged plant beds are blue-winged and green-winged teal, wood duck, gadwalls, American widgeon, and northern shoveler as well as several species of grebes. Many species of herons and egrets hunt the shallow areas of ponds for small fish and frogs where submerged plants occur. A pond managed for wildlife needs submerged plants as a habitat component.

Submerged and emergent plants also have an effect on water quality. Their ability to put oxygen into the water is an obvious contribution, but they also provide for long-term storage of nutrients that might otherwise be used to create nuisance levels of planktonic or filamentous algae. Ponds with beds of submerged plants have fewer problems with algae.

## Wetlands

Wetlands are those sensitive areas that are a transition between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is covered by shallow water. The plants that inhabit a wetland are hydrophytic, and adapted to living in hydric soils, sometimes under water. Wetlands serve an important function in that they act as a natural reservoir for storm runoff, offer flood control, recharge ground waters, and filter off toxins that would otherwise find their way in to the water table. They also provide necessary habitat for various wildlife species, unique to any other habitat type.



Most wetlands should be treated as sensitive areas and managed with the goal of maintaining the natural environment with the least amount of impact.

- Invasive and noxious weeds should be controlled through mechanical or cultural methods.
- Approved wetland herbicides should only be used only when necessary, and never near standing water.
- Native and region specific plant species should be planted within a wetland area
- Trails are kept to a minimum and specifically designed to decrease habitat disturbance.

## Riparian Corridors

Riparian corridors are sensitive areas that include an interactive vegetation community integrated with the water course eco-system. Riparian corridors provide food, shelter, breeding and rearing areas for aquatic and terrestrial animals and birds. They encompass the area that runs along both sides of the water body, ranging from 10 -50 feet wide, depending on the sensitivity classification. Included are wetlands and meadows.

- Improper clearing can have serious effects on the ecosystem, allowing for increased runoff, toxin accumulation, oxygen reduction to surrounding plants and water systems, and overall habitat destruction.
- Native vegetation is usually preserved or planted in order to mitigate any negative effects.

## Shoreline and Bank Stability

When reinforcing or protecting a shoreline, one should consider the least impact necessary to achieve reasonable stability. These practices include, but are not limited to:

- Traditional use of riprap should be used only as a last resort. Softer treatments, such as log placement and bioengineering plantings, are preferred, where feasible.
- Treatments should consider seasonal differences, and regular seasonal water level changes.

## What's Required for Certification?

*please provide the following*

- One Example Photograph of each type of Water Feature found in the Landscape (i.e., Pond, Stream, Coastline, etc. )
- Water Features depicted on Map

# Control Pests Responsibly

*Offers: Water Quality, Plant Health, Human Health, Biological Diversity*

The word “pest” has been broadly defined in this document to include “injurious” insect species, plant pathogens, noxious or invasive vegetation, vertebrate animals such as rodents, structural pests or any other factor that creates an unhealthy environment for landscapes and structures.

Integrated Pest Management (IPM) is a sustainable approach to managing pests by combining biological, cultural, physical and chemical methods in a way that will minimize the effects on the environment, minimize domestic and health risks, while considering budgetary restrictions. IPM allows for both passive and active modes of maintenance and is vital to maximizing the preservation of any environment.

Effective pest management should include all potential pest control strategies, but focuses on non-chemical controls whenever possible, in order to perpetuate a sustainable environment. The following four pest control methods may be employed:

- **Cultural Control:** The use of sound horticultural practices to optimize plant health and to suppress pest insects, disease, and weed growth. Other cultural controls include site-appropriate design and the use of disease or drought-resistant plants.
- **Mechanical Control:** The use of a variety of tools and equipment for the purpose of eliminating pests.
- **Biological Control:** The use of biological control agents that act as predators or parasites of pest species. The use of other beneficial organisms that improve plant health by enhancing soil quality.
- **Chemical Control:** The application of various agricultural products such as herbicides, insecticides or fungicides or other chemical compounds to a target pest as a means of control.

The objectives an IPM program should include the following:

- To protect the health, safety, and welfare of the community
- To provide efficient cost effective maintenance of natural resources, which includes non-chemical controls whenever possible
- To design new and renovate existing landscape areas that suit site conditions with sustainable maintenance practices, thus providing comprehensive stewardship of natural resources
- To restore, create and protect environmentally valuable areas such as wetlands and riparian areas, aquatic and terrestrial wildlife habitat, forests, and meadow areas.

## Remove Noxious and Invasive Plants

Communities should strive to ensure that public landscapes remain attractive and meet the expectations of residents, and preserve natural ecosystems for future generations. These green open spaces offer residents the opportunity to enjoy a natural environment within their community. Trees, shrubs, flower beds, ponds, rivers and lakes make up these open spaces, and require maintenance and protection from damage by both humans as well as biological pests.

If aggressive invaders gain a foothold in your landscape site, they may compete more successfully than the more desirable plants. The best way to deal with aggressive invading species is to recognize them early and remove them as they appear. Use lists of your area’s invasive exotics published by your state native plant society to determine whether a newcomer is an appropriate resident. If it is not, remove and destroy it. Waiting until invaders are well established will make more drastic removal methods necessary.

Remove weeds from plant beds. Weeds need access to light, so be sure to block out the sunlight by mulching the soil with good organic compost.

## Nuisance Wildlife Control

Certain wildlife species can be destructive to natural areas when their activities are excessive. Overall, we should not encourage the interference with wildlife, and have a preference to leave them to their natural behaviors. If control of wildlife is deemed necessary, working with the most appropriate city (Animal Control) or state (Department of Wildlife) agency to formulate a control solution is the best alternative.



## Pest Management Recommendations

- All reasonable, cost effective non-chemical pest control options should be considered first before resorting to the use of pesticides
- Practicing IPM in all pest management situations should occur while understanding that some situations will require the use of a pesticide product.
- Certain levels of pest problems or populations should be accepted within established thresholds. Those thresholds will vary with the pest and the landscape setting.
- Performing calendar-based pesticide applications should not occur.
- Only pesticides approved for a particular use should be used for the prescribed applications. When pesticides are applied, the smallest effective area should be treated, and the application should be timed to minimize public contact and the effects on the environment.
- Whenever possible, pesticide applications should be carefully timed to control the pest and reduce the need for retreatment.
- Pesticide applicators should strictly observe all pesticide products label requirements. All chemicals used should have an MSDS on file, and be available to all staff, contractors and the public upon request.
- Pesticides should not be used to control plants with edible fruit during the fruiting season unless the plant being controlled is not of sufficient size to produce fruit. Fruiting plants such as blackberries should be first cut to the ground, allowed to re-sprout and then chemically controlled before the plant can produce fruit. Plants controlled in this manner should never be allowed to produce fruit in the future.
- All sites where pesticides have been applied should be posted and all applications of pesticides should be recorded.
- When pesticides are used in confined environments such as greenhouses, the facility should be clearly posted "Closed to Entry" until the reentry time period has elapsed.
- Training for all staff who apply pesticides should occur and emphasize learning new pest control techniques, as they are available.
- Field testing alternative controls to pesticide use and implementation of successful control options as budget allows should be an ongoing activity.
- To promote public understanding and support of the benefits of the IPM program, educational assistance and information should be provided to the public regarding the use of pesticides.
- Compliance with all Federal, State and Local regulations pertaining to the application, handling, storage, and disposal of pesticides should *always* take precedence.



## What's Required for Certification?

*please provide the following*

- List of Pests being Managed
- List of Pest Management Practices Used
- List of Pest Management Products

## Provide Amenities for Humans & Wildlife

*Offers: Social and Recreational Opportunities, Outreach and Education, Biological Diversity, Wildlife Conservation*

Due to urbanization and land development, wild animals are displaced from their habitats and have adapted well to living near humans. It should come as no surprise, and is rather quite common to encounter wildlife on a regular basis in our communities. Because of diminishing wildlife habitat, conflicts are inevitable and will occasionally arise between humans and wild animals. In the past, many animal control agencies responded to these situations by picking up and relocating or euthanizing trapped wildlife. We now recognize that these past practices simply do not work. Trapping and relocation of healthy wildlife is no longer considered as a recommended or viable alternative. Wild animals are territorial and like species will simply take over the area vacated by the relocated or deceased animal. Communities and neighborhoods should learn to respectfully co-exist with wildlife.

The processes of urbanization not only destroy, degrade and fragment habitat for wildlife, but also create new habitats that may benefit certain species in unexpected ways. Areas of native vegetation that once supported many species are reduced in size and modified over time by changes to disturbance regimes and invasion by weeds and feral animals. Wildlife populations that persist in these habitat patches are often isolated from each other by a hostile combination of roads, housing and domestic pets, leading to an increased probability of local extinction. Conversely, public and private gardens and planted street trees can support a surprising diversity of native amphibians, reptiles, birds and mammals. Interactions between humans and wildlife in urban areas include observation, provision of food and shelter, and even competition for resources such as fruit and vegetables in backyard gardens. In general, many humans enjoy the presence of native animals until they cause a perceived nuisance or potential danger to human safety. We need to better understand the ecology of wildlife in modified urban habitats, and also consider human behavior and education, if we are to successfully conserve a proportion of the biological diversity within our urban environments.

Communities should work to promote habitats that will have the food, cover, water, and living space that all wildlife require by following these guidelines:

- Maximize open space and make an effort to protect the most valuable wildlife habitat areas of a landscape.
- Provide water, and design stormwater control impoundments to benefit wildlife.
- Use native plants that have value for wildlife as well as aesthetic appeal.
- Provide bird-feeding stations and nest boxes for cavity-nesting birds like house wrens and bluebirds.
- Educate residents about wildlife conservation, using, for example, information packets or a nature trail through open space.
- Ensure a commitment to managing urban wildlife habitats.

### Providing for Birds

Birds are the animals that most often come to mind when people think about animals they see in their community. Many people have bird feeders in their yards and these feeders can be important to birds, especially when there are limited natural food sources, like during migration, periods of drought, or in the winter.

Shrubs, annuals, perennials, native and cultivated plants can all be used to attract such birds. If it is possible, grow plants that provide seeds and fruits for all seasons.

Once birds have become accustomed to visiting a landscape, they will return with regularity. When the winter months roll around, natural food will become scarcer, so it is more important during those months to provide plenty of seed, fruits or suet during those times to keep your feathered friends around the landscape.

When it is at all possible, a water supply should be included into any landscape. This is easily accomplished by the inclusion of a birdbath, which gives birds and other wildlife the water they need and enjoy.



## Trails

Trails play an integral role within any communities. Trails provide non-motorized and recreational opportunities for walkers, bicyclists, joggers, hikers and birdwatchers. They are the string that physically connects landscapes, parklands, neighborhoods, schools, and businesses. In addition to providing recreation, trails foster an appreciation and respect of nature.

Trails should be designed and constructed in an environmentally sensitive manner to reduce soil compaction, erosion, and runoff to protect sensitive areas from degradation. Trails should be developed based on site assessments that consider natural features, aesthetics, and their linkage possibilities, and can be natural or comprised of a covering such as bark, shell, or stone/gravel, or be asphalt or gravel.

## Public Education and Community Outreach

Public education plays an important part in any community. Well-planned education and outreach activities can help generate understanding and support for the environmentally friendly management strategies taking place within the community .

Human communities, whether clusters of homes, towns, cities, or other collections or networks of people are part of the natural environment. We live among, and are deeply connected to, the many streams, rivers, lakes, meadows, forests, wetlands, and mountains that compose our natural environment and make it the beautiful and livable place so many of us value. More and more often, human communities realize that the health and vibrancy of the natural environment affects the health and vibrancy of the community and vice versa.



## Use Environmental Signage throughout the Landscape to Promote Environmental Awareness

Environmental awareness provides people with the knowledge, and addresses how their community has integrated environmental values into the fabric of the community. this awareness fosters stewardship activities that can include joining environmental groups, purchasing environmentally friendly goods and services, or performing specific behaviors, such as recycling household waste, taking used motor oil to collection centers, and using public transportation.

Environmental awareness and values also describes the different ways community members value the environment. They might appreciate the role of wetlands in protecting the quality of their drinking water supply or the role of trees in reducing their home heating bills by providing summertime shade. They might also value the environment for the recreation opportunities it affords or simply the way it makes them feel.

Mounting environmental education signs is a simple way to educate the public about the environmental attributes o a landscape and the special features of a site. They also can be used to protect areas of special concern or to provide direction or instruction.

## What's Required for Certification?

*please provide the following*

- One Photograph of a Human Amenity (benches, signs, street lighting)
- One Photographs of a Wildlife Amenity (birdbox, birdfeeder etc.)

# Use Technology and Innovation

*Offers: Water Quality, Energy Savings, Resource Management, more...*

We recognize that there are numerous ways to incorporate green technologies into any landscape. This is your opportunity to showcase the unique innovation and green technology strategies employed in your landscape.

## **Potential Technology & Innovation Projects for Landscapes**

### Fertigation

Fertigation is a landscaping and gardening practice in which water-soluble materials are added to the water used for irrigation. Classically, fertigation supplies nutrients in the form of fertilizers, although it can also be used to deliver soil amendments and a variety of other materials, including chemicals to cope with pests and plant diseases.

This technique can reduce fertilizer application costs by eliminating high operational requirement. It may also improve nutrient efficiency by applying them closer to when the plant needs them. Fertigation is becoming widely accepted in the industry due to the fact that a properly designed system will perform accurately, is now economical, easy to install, saves time, labor and most importantly, will save you money. A proper system will eliminate waste, sludge and residues. It allows one to "fine tune" fertility levels, and will monitor the rates of fertilizer being applied. A good system will also address the reduction of fertigation water runoff.

### Xeriscaping

An added benefit of Xeriscape landscapes is less maintenance. A well-designed landscape can decrease maintenance by as much as 50 percent through reduced mowing, once-a-year mulching, elimination of weak, un-adapted plants, and more efficient watering techniques.

### Rain Gardens

Rain gardens are becoming and increasingly popular landscape feature. A rain garden is a natural or dug shallow depression designed to capture and soak up stormwater runoff from roofs and other impervious areas such as driveways, walkways, and even compacted lawn areas. They can be used as a buffer to shoreline areas to capture runoff from the landscape before it enters a lake, pond, or river. The rain garden is planted with suitable trees, shrubs, flowers, and other plants allowing runoff to soak into the ground and protect water quality.

In addition to adding beauty to the landscape, rain gardens also help protect water quality by reducing stormwater runoff. Stormwater runoff is considered one of the main sources of water pollution on the planet. A rain garden will allow the runoff generated on the landscape to infiltrate into the ground and help to reduce potential water quality problems.

### Rainwater harvesting

Rainwater harvesting or "living water" harvesting involves collecting and storing rainwater for future use and it has become a common practice in many parts of the world that receive dry, humid weather and very little rainfall. Now, it is gaining popularity again in North America, particularly in British Columbia. In B.C., residents are using rainwater harvesting as a sustainable water source for household use, organic farmers are using it to grow supposedly healthier plants and crops, and commercial green houses and public buildings are recognizing its water-conserving benefits as well.

### Using Pervious or Permeable Pavers

Permeable Pavers help protect the quality of our water supplies. They reduce the amount of storm water runoff entering our natural waterways and carrying with it contaminants and pollutants. Pervious and permeable pavers allow rain water to naturally drain into the surface through the voids in the pavers. This promotes the infiltration of rainwater and also helps to recharge the groundwater.

Using permeable pavers within a landscape also means less storm water runoff, which means that our streams and riverbeds are less likely to flood as often. This also means that there will be a reduction in the rate of the erosion of riverbanks and streambeds.

### Using Non-Potable Water to Irrigate such as Reclaimed Water and Effluent

Reclaimed water is an important component of wise water management. Reclaimed water is derived from domestic wastewater and small amounts of industrial process water or stormwater. Using reclaimed water has multiple benefits such as; it costs less than drinking water, it reduces fertilizer use, as some nutrients like nitrogen and phosphorus remain, it reduces stress on drinking water supplies, and it reduces disposal into waterways, which can help reduce nutrient loads in bays and rivers.

### Composting

Compost is organic material that can be used as a soil amendment or as a medium to grow plants. Mature compost is a stable material with a content called humus that is dark brown or black and has a soil-like, earthy smell. It is created by: combining organic wastes (e.g., yard trimmings, food wastes, manures) in proper ratios into piles, rows, or vessels; adding bulking agents (e.g., wood chips) as necessary to accelerate the breakdown of organic materials; and allowing the finished material to fully stabilize and mature through a curing process.

Yard trimmings and food residuals together constitute 23 percent of the U.S. municipal solid waste stream. That's a lot of waste to send to landfills when it could become useful and environmentally beneficial compost instead. Composting offers the obvious benefits of resource efficiency and creating a useful product from organic waste that would otherwise have simply been sent to the landfill.



### There are Many Opportunities for Innovation and Technology in a Landscape

- Incorporating Eco-friendly & Sustainable Design concepts
- Using salt tolerant turf grasses in coastal areas
- Using rain collection techniques such as rain barrels, and catch basins
- Using Weather Stations
- Creating Stormwater Planters
- Soil Moisture Sensors
- Recycled Lumber
- Green Roofs
- French Drains
- Investing or participating in Carbon Sequestration Projects
- Incorporating products that reduce erosion

### **What's Required for Certification?**

*please provide the following*

- One Photograph of Innovation or Technology Used
- Description of the Innovation or Technology



# The Sustainable Golf Course Landscape Certification Application

Contact Name \_\_\_\_\_

Property Name \_\_\_\_\_

Lawn Care Provider \_\_\_\_\_

Address \_\_\_\_\_  
\_\_\_\_\_

City, State, Zip \_\_\_\_\_

Phone \_\_\_\_\_

Fax \_\_\_\_\_

Email address \_\_\_\_\_

Website Address \_\_\_\_\_

## Documentation Requirements

- Platinum ISC-Audubon Membership
- Completed Natural Resource and Landscape Survey
- Certification Requirements of this Workbook have been met
- Map of the Site with Requested Features Depicted

**The Sustainable Golf Facility Program is free for ISC-Audubon Platinum Members.** Platinum Membership fees include a one-time registration fee of \$250 (first year membership included), and then only \$100 annually. Maintaining Platinum Membership is required in order to retain certification. To begin participation in the program mail, fax or email this application form with Platinum Membership (if applicable) registration fee (check or credit card). Membership applicable for one location only.

- We are already a Platinum Member and wish to submit this application for free
- I would like to become a Platinum Member. Please add the cost of membership (\$250) with this certification request and mail me a new Member packet today!

Name on Card \_\_\_\_\_

Credit Card Number \_\_\_\_\_

Exp. Date \_\_\_\_\_

By signing below you indicate that all photographs, and documentation submitted, and that all information submitted is accurate to the best of your knowledge.

Signature \_\_\_\_\_

Date \_\_\_\_\_

Print Name \_\_\_\_\_

Please mail this completed registration form, with required verification documentation and photographs to:  
**ISC-Audubon — 35246 US Hwy 19 #299, Palm Harbor, FL 34684**