SOUND GARDENING

Gardening With an Eye on Water Quality

YOURGARDENANDTHESOUND

Our Coastal Waters are the Heart of our Region

Water quality in any area affects the quality of life. Industry, recreation and even the wholesomeness of the fishandshellfishyoueatdependonit. Streams, rivers and storm drains are direct connections from your yard to rivers, Long Island Sound, bays and the ocean. What'you do in your yard contributes to clean or polluted coastal and groundwaters. *Sound Gardening* practices can reduce the threat to water quality while heiping you have a better garden.

Our ***Sound is in Trouble***

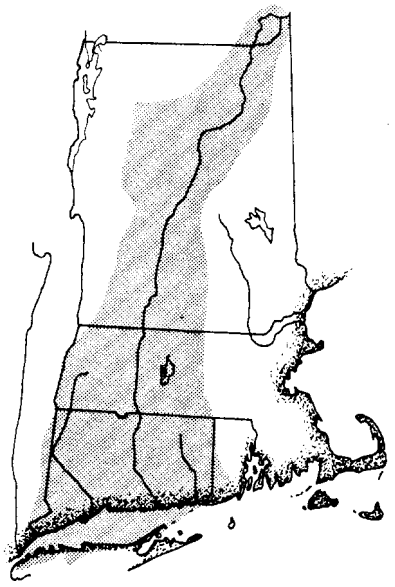
Many areas of Long Island Sound suffer from past and present pollution. Efforts such as the federally-sponsored Long Island Sound Study are underway to clean up and protect the Sound.

We have long been aware of pollution from *point sources* such as factories and sewage treatment plants. We have recently become more aware of the threat of *nonpoint source* pollution. This is pollution created by many relatively small and widespread sources such as stormwater runoff. Each of these sources by themselves may seem insignificant; but, added together they pose a serious threat.

Garden Practices Affect Water Quality

There are hundreds of thousands of homes with gardens in Connecticut and New York that potentially contribute runoff to Long Island Sound. Each may contribute a relatively small amount of runoff containing

soil, chemicals, and fertilizers. They add up to a sizable problem. Nonpoint pollution will be controlled only when individuals take responsibility and make wise choices.



Long Island Sound Watershed

Everyone Lives in* a *Watershed

Each time it rains or snows, almost every square inch of the region contributes to the water flow into Long Island Sound and the ocean. Rivers, streams, groundwater, gutters, storm and sanitary sewer systems, hills and bottom lands are all part of the system.

Everyone Lives on a Stream

Whether a stream is a natural channel or a constructed one like a storm sewer, the effect is the same. Eroding soil and the runoff or leaching of fertilizers and chemicals have an impact on our lakes, streams, bays and the Sound. Most storm sewerwater goes into the Sound or groundwater untreated. Even sewage treatment does not remove all pollutants.

Whatever is poured, spread or sprayed on plants or the ground in excess can find its way into the Sound or groundwater. Just because a problem flows away from the property does not mean it is eliminated.

SOUND GARDENING

This is a program to integrate good gardening practices with good water quality practices. The same simple, practical techniques that improve the soil, beautify the landscape and reduce maintenance time and cost, can also protect the quality of our water and the Sound. Sound ***Gardening can*** add not only to the value of your property and the pleasure derived from it, but also contributes to a cleaner Long Island Sound.

REMEMBER

The key to Sound ***Gardening*** is to reduce the amount of potential contaminants introduced into the environment by overfertilization and indiscriminate use of pesticides and to minimize the amount of water that runs off your property.

For more information about Sound Gardening for both a better garden and a cleaner Sound, call or visit your local Cooperative Extension office.

In Connecticut:				In New York:	
Storrs:	(203)486–3435	Litchfield:	(203)567–9447	Nassau	(516)454–0900
Fairfield:	(203)797–4176	Middlesex:	(203)345–4511	Suffolk	(516)727–7850
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Sound ***Gurdening was*** made possible through the combined efforts of Cornell Cooperative Extension of Nassau, Suffolk, and Westchester Counties, University of Connecticut Cooperative Extension System, and the Sea Grant Programs of New York and Connecticut. Artwork by Susan Stone.

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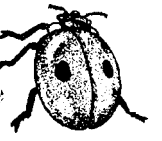
PEST MANAGEMENT

Pests are organisms that harm gardens and landscapes. Many people think of insects when they think of pests, but fungi, bacteria, viruses, weeds, rodents and other animals can be as troublesome. They compete with us for food, injure plants and are a general annoyance. Pests can often be controlled without **undue** damage to the environment.

A totally pest-free garden, though seemingly desirable, would be expensive and is **unattainable**. A more reasonable plan should be to keep pest populations within a tolerable level, a concept known as integrated pest management or IPM. A low level of pests must survive in order to maintain a population of their natural enemies.

Know the Garden

Do you know what is going on in your garden? Inspect the plants for insect and disease damage. Find out what is living on the underside of the leaves. What creatures can be found under the cover of darkness?



Many insects such as ladybugs and praying mantises are beneficial. Only a relatively small number of species are harmful. Plants can tolerate some insect damage without significant loss to yield or aesthetics.

Good gardening is based on understanding nature's interactions. At the first sight of an insect, weed or disease,

stay calm. Do not run for the sprayer or duster. Find out if it actually is a pest (check with Cooperative Extension, a garden center or applicable reference), and if so, use the least toxic methodofcontrol, i.e.,pull theweed,removethediseasedleaf or squash the harmful insect. The more often garden chemicals are used, the greater the risk of endangering our health and the environment.

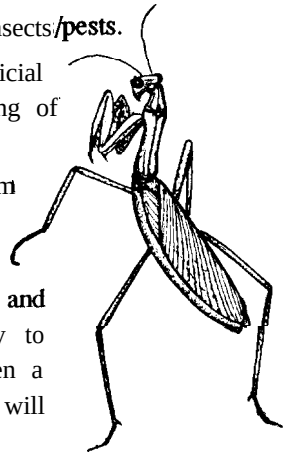
By looking at the pest problem realistically, it is possible to:

- save money by buying fewer pesticides
- save time by addressing only what needs to be controlled
- save the Sound and other water bodies by introducing less chemicals into the environment.

Sound Gardening Prevents Problems

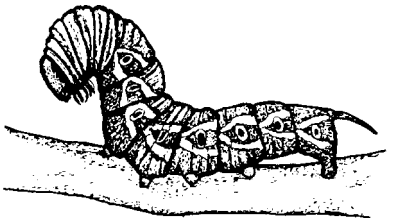
Make the garden a healthy place for preferred plants and an undesirable place for pests by:

* Selecting appropriate species or varieties that are insect and/or disease resistant.
* Providing proper moisture levels to maintain plant health and thus conserve water.
* Maintaining proper fertility and pH levels by having the soil tested and applying only the nutrients needed. Soil amended with compost or other types oforganic matterwill helpretain fertilizer.
* Rotating various groups ofplants, where practical, to reduce insect and disease problems.
* Keeping the garden free of debris (dead plants, discarded bricks or boards and brush piles) to limit hiding places for insects and slugs.
* Timing plantings to avoid known insects/pests.
* Encouraging the buildup of beneficial insects and mites, and the planting of omamentals.
* Properly identifying the problem before control measures are activated.
*Estimating the potential damage and deciding whether it is necessary to control insects and mites. If given a chance, perhaps natural predators will take over.



* Selecting the least toxic chemical approach to control the problem.
* Observing and recording the results of any activity taken. Remember, a decision not to spray is an action taken.

Non-Toxic Control Methods



Insects

- Prune out heavily infested parts of the plant. This method is often used against localized infestations of scale insects.
- Cover crops with screening, floating or framed row covers, etc., to prevent insects from migrating from nearby areas. The covers must be removed when insect pollinated crops come into flower.
- Insect traps can be used. Follow instructions for critical density per crop.
- Wash insects and mites off with a stream of water.
- Hand pick insects and slugs and squash egg masses.

Diseases

- Plant disease-resistant varieties.
- Rotate annual and vegetable plants where practical and avoid using plants especially prone to disease attacks.
- Space and prune plants to improve air circulation.
- Time overhead irrigation early enough in the day to allow the foliage to dry before nightfall.
- Avoid infecting other plants by pruning out diseased parts and discarding heavily diseased plants.

Slugs

- Use shallow containers of beer to monitor for slugs.
- Provide hiding places (overturned pots, boards, burlap), check them frequently and kill slugs.

weeds

- Use mulches to prevent weed germination.
- Hand weed and/or cultivate weekly.

Pesticides

Pesticides (insecticides, miticides, herbicides, etc.) are chemicals used to control pests. If used improperly, they can have an impact beyond their intended target. The continuous accumulation and combination of small amounts of toxic substances can create problems. If misused, small quantities of toxic chemicals can cause environmental disruption.

A pest population can become resistant to pesticides when only one or two products are used repeatedly against a specific pest. Synthetic chemical pesticides should be the last defense to control a pest only after other forms of control have been exhausted.

The ***Sound Gardening*** strategy is to reduce the amount of chemicals introduced into the environment, apply the product properly only when needed and keep pesticides in the target area.

If Pesticides Are Used!

Chemical controls should be applied only when the pest is present or if weather conditions are favorable for the outbreak of a regularly occurring disease (scab on an apple). Spraying should not be set by the calendar. Schedule treatments to be most effective and least disruptive tonaturally existing pest predators. Be sure to use proper safety equipment and procedures as directed on the label.

Choose *the Right Chemical*

Seek good advice when in doubt about a problem. Choose the least toxic alternative: pyrethrins, insecticidal soap, horticultural oils, rotenone and the biologicals, *Bacillus thuringeinsis* (B.t.) and milky spore. Buy only what you need for one season. Some pest control products lose their effectiveness sitting on the shelf. Some will require specific storage conditions.

Check the Label

Re-read the label each time you use the pesticide. Make sure the pest and plant or site is listed. Labels change and newer restrictions could have been added.

Mix Correctly

Do not guess when mixing. Measure and follow the label recommendations carefully, mixing only the amount that you will use that day. Do not add more than is required. It can damage the plant or harm people and the environment.

Be Prepared For Spills

Clean up spills right away. Your chemical storage area should have a non-porous floor to facilitate cleaning spills. It should not have a drain. Set up a barrier to contain spills such as cat litter. Do not flush spilled material down a drain. Carefully sweep up spilled powders and dusts. Scrub wood, cement or tile surfaces with a small amount of water and activated charcoal. Place all contaminated material in a plastic bag, seal and dispose of properly at a household hazardous waste collection day or facility.

Apply Chemicals Properly

Read and follow all safety precautions on the label. Do not apply pesticides when:

- it is windy or raining
- there is a possibility they will enter a stream, lake or drain
- the temperatures are above 85°F.

Disposal of Leftover Pesticide Mix

Use it up as directed on the label. Never pour onto bare ground or down a drain.

Disposal of Unused Pesticide Concentrate

Use the pesticides as directed on the label. Record how much was actually needed for future reference. Do not pour unused portions down a drain. It could end up in the Sound. If the pesticide is no longer effective or wanted, call the town for information on household hazardous waste disposal programs in your area.

Store Properly and Safely

Store all pesticides in their original properly labeled containers. Keep them on secure strong shelves in a locked cabinet away from heat andmoisture. Always keep them away from children, pets and irresponsible adults.

Dispose of Empty Containers Properly

Triple rinse empty containers and use the rinse water for the spray. Read the label for proper disposal instructions.

REMEMBER

* Practicing ***Sound Gardening*** prevents pesticide misuse.
* Pest control choices can impact water quality.
* Good garden management is the best means of controlling pests.
* Many insects are not harmful to plants.

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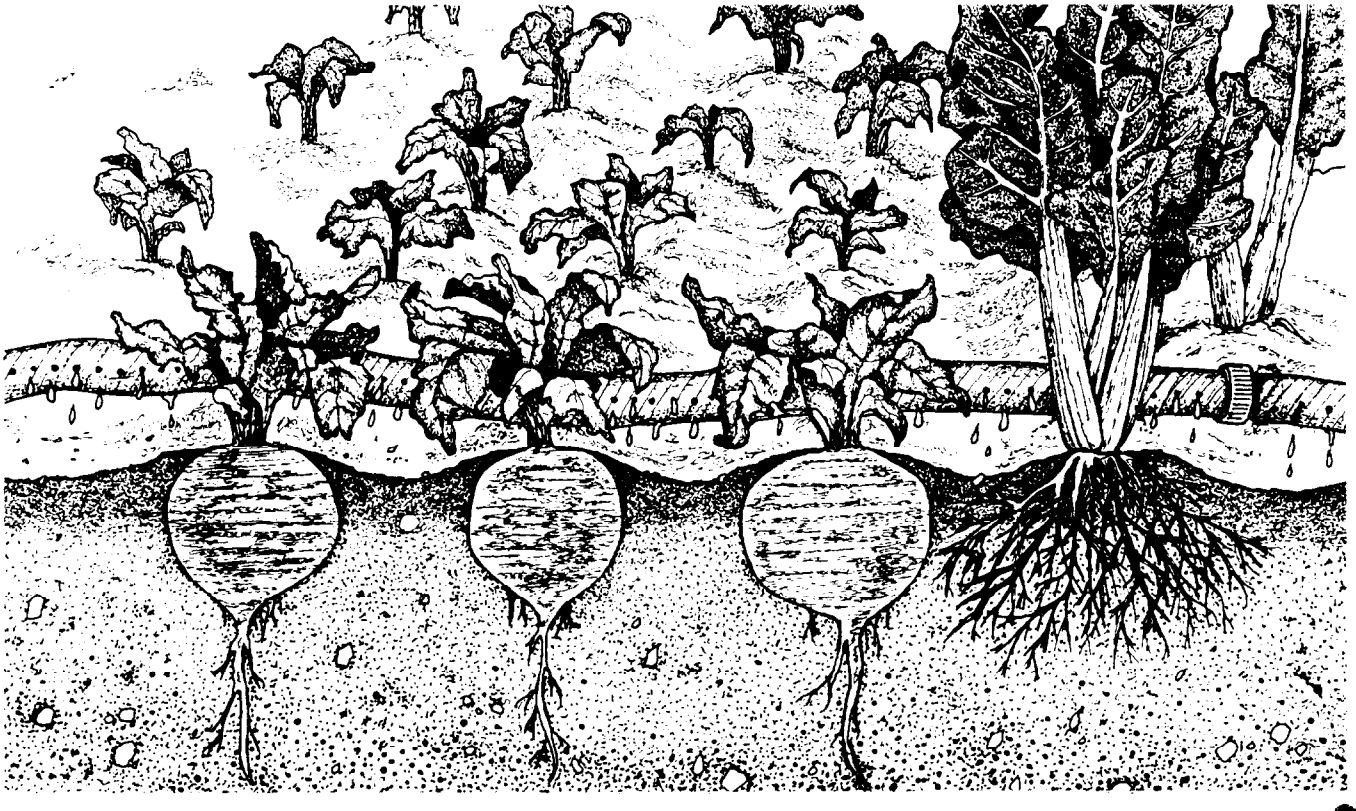
WATERING



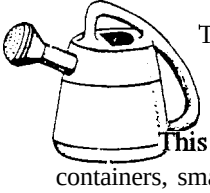
Plants Need Water

Proper watering is essential to a healthy garden. A plant is 75–90% water. Water is necessary for all internal plant functions such as photosynthesis and the transportation of nutrients. If water is applied at the proper times in correct amounts, it is possible to conserve it, thereby protecting water quality in the Sound.

Overwatering can wash away soil, chemicals and plant nutrients. They can find their way into rivers, Long Island Sound, bays and the ocean – a loss to the garden and a hazard to marine life.

> The *Sound Gardening* approach to watering is to plant drought-resistant species, landscape using xeriscape principles (planned, drought-resistant landscapes) and to water only when needed.

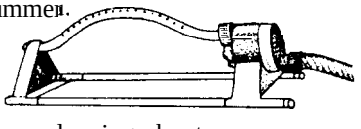
Ways to Water



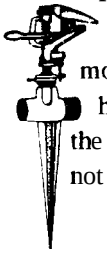
The method you use can make a difference.

Hand Held Water Can or ***Garden Hose***

This method is only appropriate for containers, small flower beds, newly planted trees, shrubs or recently sown flower or vegetable seeds. A small garden will require a great deal of time and patience to hand water properly. Sinking perforated plastic jugs into the ground next to plants will encourage infiltration. Using mulch will keep the soil moist and cool in the heat of summer.



Sprinklers

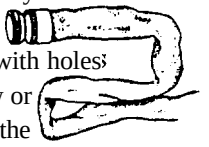


Keep the water pattern even by moving the sprinkler frequently and overlapping about one half of each pattern. Place oscillating sprinklers higher than the plants to prevent water from being diverted by leaves. Do not apply water faster than the soil can absorb it. Be sure the

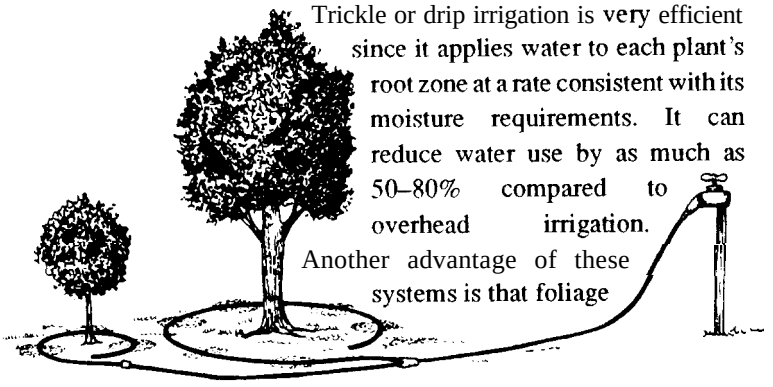
sprinkler is not watering the sidewalk, street or other paved surface.

Sonker Hoses

There are a variety of special soaker hoses. They can reduce runoff and evaporative losses and generally do not cost more than normal garden hoses. Perforated plastic hoses or soaker hoses should be placed with holes facing downward along one side of the crop row or underneath mulch. Water will slowly soak into the soil without wetting foliage, thus decreasingevaporation and the risk of foliage diseases.



Trickle and Drip Systems



Trickle or drip irrigation is very efficient since it applies water to each plant's root zone at a rate consistent with its moisture requirements. It can reduce water use by as much as 50–80% compared to overhead irrigation. Another advantage of these systems is that foliage stays dry, reducing the potential for foliage disease problems.

When to Water

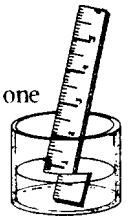
Wateronlywhenneeded. Agoodruleofthumbinwatering plants is to saturate the entire root zone and then allow the soil to dry out partially before the next irrigation. The speed of drying depends on plant size and species, the ability of the soil to hold water and the weather.

A small or newly-established plant will need watering before very much soil drying takes place – generally within a few days to one week. Seeds **and seedlings need more frequent watering as they should never be** allowed to dry out. A vegetable garden should be watered when the soil within 1" of the surface feels dry to the touch. When a lawn gets too dry it shows **a loss** of resilience: footprints will remain visible in the grass and its color will change to a grayish Hue.

Once plants are established, less frequent, deep watering with dry periods in between encourages deep roots. Gradually extend the length of time between waterings.

Do not rely on automatic timers. If you use an automatic system, install a moisture sensor to turn it on and off. Also, do not water on windy days or during the heat of the day, especially with sprinklers; considerable water may be lost to evaporation. Early morning watering is best for lawn.. and most other plants.

How Much Water



A running hose can deliver about 375 gallons in one hour. Too much water, especially in poorly drained soils, can be damaging. Apply water only as fast as the soil can absorb it. Turn off water at the first sign of puddling; turn it back on later if water did not penetrate the whole root zone. Do not apply water at rates greater than 1/4" to 1/2" per hour; faster watering can cause runoff and/or erosion. Use small containers to measure the amount of water being applied. A lawn can use I" to I 1/2" of water per week during hot, dry weather.

How to Reduce the Need for Water

* Select low water use plants.
* Add organic matter to the soil to increase the water holding capacity of sandy soils and allow for better air and water movement in compacted soils.
* Design the landscape around sound xeriscape principles, consolidating plants requiring similar amounts of irrigation. Azaleas and rhododendrons could be grouped in one area, junipers and potentilla in another.
* Select a turfgrass that excels in low water conditions.
* Mulch the tilled areas to help reduce evaporation of water.

REMEMBER

* Water deeply and slowly.
* Water when needed, not according to a **pre-determined** schedule.
* Water only as fast as it can be absorbed by the soil.
* Follow watering restrictions when and where they **exist.**

For more information on ***Sound Gardening and*** **watering,** contact your local Cooperative Extension office.

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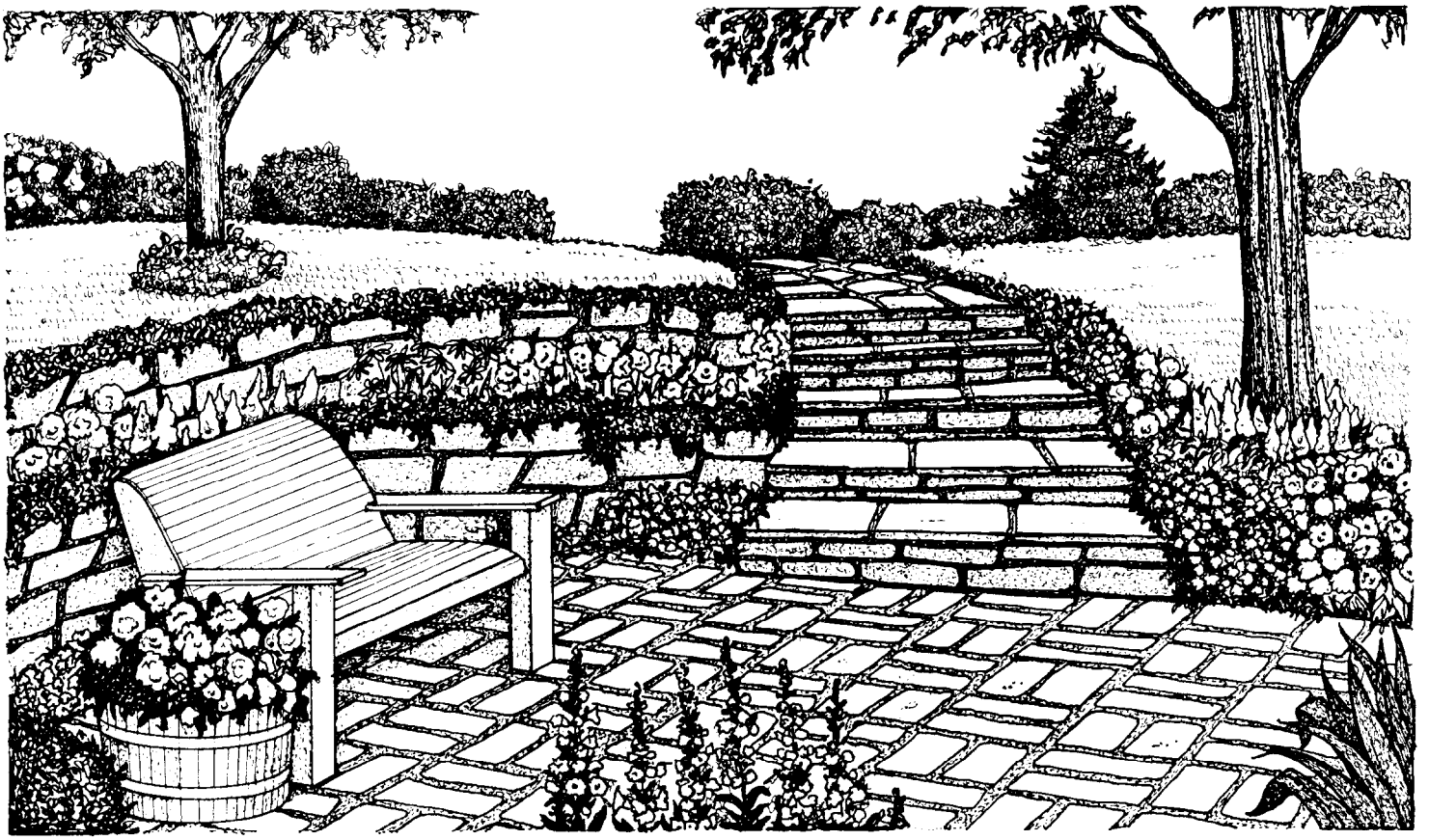
LANDSCAPING



Development of open land and woods has increased the area covered by buildings, paved surfaces and turf. This kind of development changes Long Island Sound's watershed, causing increased runoff that carries more contaminants and occurs more rapidly after a storm. Storm sewers carry most runoff untreatedinto surface or groundwaters. Gardeners can help alleviate the runoff problems by reducing the volume of water leaving their property.

Observe *the Water Flow*

Start by watching the pattern of water flow on and around the garden and lawn. Does overflow run off in a heavy rain, carrying soil with it and exposing plant roots? Does the water penetrate to plant roots when watering or does it run uselessly down the sidewalk, driveway or alley and into the storm drains?

Making Landscape Choices

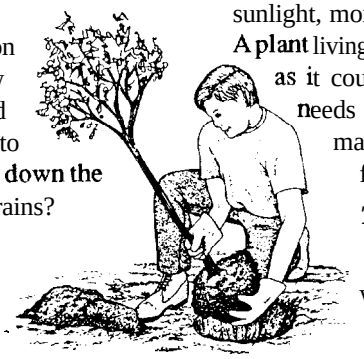
Your landscape choices can improve the beauty of the garden and the water quality of streams, rivers, the Sound, the ocean and groundwater. Properly selected plants or landscaping features can reduce runoff and minimize the amount of pesticides and fertilizers applied to lawns and gardens. Plant selection, turf areas, types of walks and decks, and control of water infiltration and flow affect water quality in the Sound.

Plant Selection

All plants have their own special requirements in terms of sunlight, moisture, temperature range, soil type and fertility needs. A plant living in less than optimum conditions will not be as healthy as it could be under ideal conditions. Selecting plants with needs that match what the site can provide will minimize maintenance, enhance plant health and reduce the need for fertilizers and pesticides.

Turf Choices

Turf can remain an integral part of the landscape without being a heavy user of water, fertilizer and pesticides. Good quality turf *can* be maintained with limited use of chemicals. When a new lawn or



All non-biodegradable covering and nylon twine must be removed before planting.

renovation is planned, select turfgrass types and varieties that are low maintenance and disease-resistant. Your local Cooperative Extension staff can provide you with a list.

It is not wise to grow grass:

- in dense shade with shallow tree roots
- where maintenance is difficult (under low branches, on steep hillsides. etc.)
- where intensive traffic tramples all vegetation and compacts the soil.

> The *Sound Gardening* strategy to landscaping is to plant low maintenance, disease-resistant species and varieties and follow xeriscnping principles (planned drought-resistant landscapes).

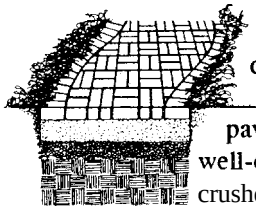
If you decide to reduce the area devoted to lawns, use ground covers such as English ivy or Pachysandra. shrubbery borders and trees. These types of plants help to:

- give an increased sense of space
- reduce home heating and cooling costs by blocking the cold winds of winter and providing shade in the summer
- encourage birds, many of which are natural predators of bothersome insects, by providing nesting sites and creating wildlife habitat
- reduce the use of chemicals: properly selected and planted woody plants generally require less chemical applications
- reduce the amount of water needed
- allow for more time to enjoy the garden as less time must be spent maintaining it.

Selecting Walkways

Concrete and asphalt seal the land, eliminating infiltration and causing runoff in areas that could otherwise soak up the water. Following are some paving surfaces that can offer permeability as well as durability.

Modular Pavers



In moderate traffic areas where turfgrass is desired, modular pavers can be used. This category includes stone, brick and lattice paving blocks. They can be used on any well-drained soils and must be placed on a base of crushed stone or sand. To further camouflage these blocks, soil can be placed in open spaces between bricks and grass seeds sown. Maintenance is similar to the rest of the lawn.

Wood Decking

A low deck, with a 2" x 6" board surface, serves as an attractive and functional ground surface. Heights can vary to make a yard more interesting and to suit the terrain. Properly designed decking constructed with appropriate material (either cedar, redwood or treated wood) will last a long time. Spaces between the boards allow for the easy infiltration of rainwater. Decks generally shade out most weed growth. Pea gravel. 1/2" to 3/4", 2" to 3" deep. will allow for infiltration of water and reduce erosion under the deck.

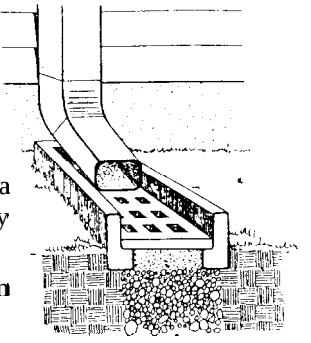
Stone or Gravel

These can make an attractive surface. Be sure to use porous sheeting underneath to help stabilize gravel and to control weeds while permitting water infiltration.

Controlling Runoff

Think about the ultimate destination of rainwater. Runoff from roofs and paved surfaces can be deflected onto and spread over well-drainedsoil where infiltration will occur. Encourage retention and infiltration of runoff by:

- using gravel or modular pavers installed in low lying areas where runoff may be detained, allowing it to infiltrate the soil more efficiently
- using gravel seepage pits, a dutch drain or a series of infiltration beds underlain by either a gravel or tile drainage system
- using gravel trenches or french or curtain drains along driveways and pathways
- terracing
- directing runoff across vegetated surfaces – reseeding bare patches in the lawn as soon as possible.



Dutch Drain

> REMEMBER
>
> * Design the yard to suit your needs and protect water quality.
> * High quality turfgrass can be maintained using limited chemical inputs.
> * Keep rainfall and irrigation water on your yard.
> * Use permeable paving materials wherever possible.
> * Choose xeric/low water use plants.

For more information on ***Sound Gardening*** and erosion, contact your local Cooperative Extension office.

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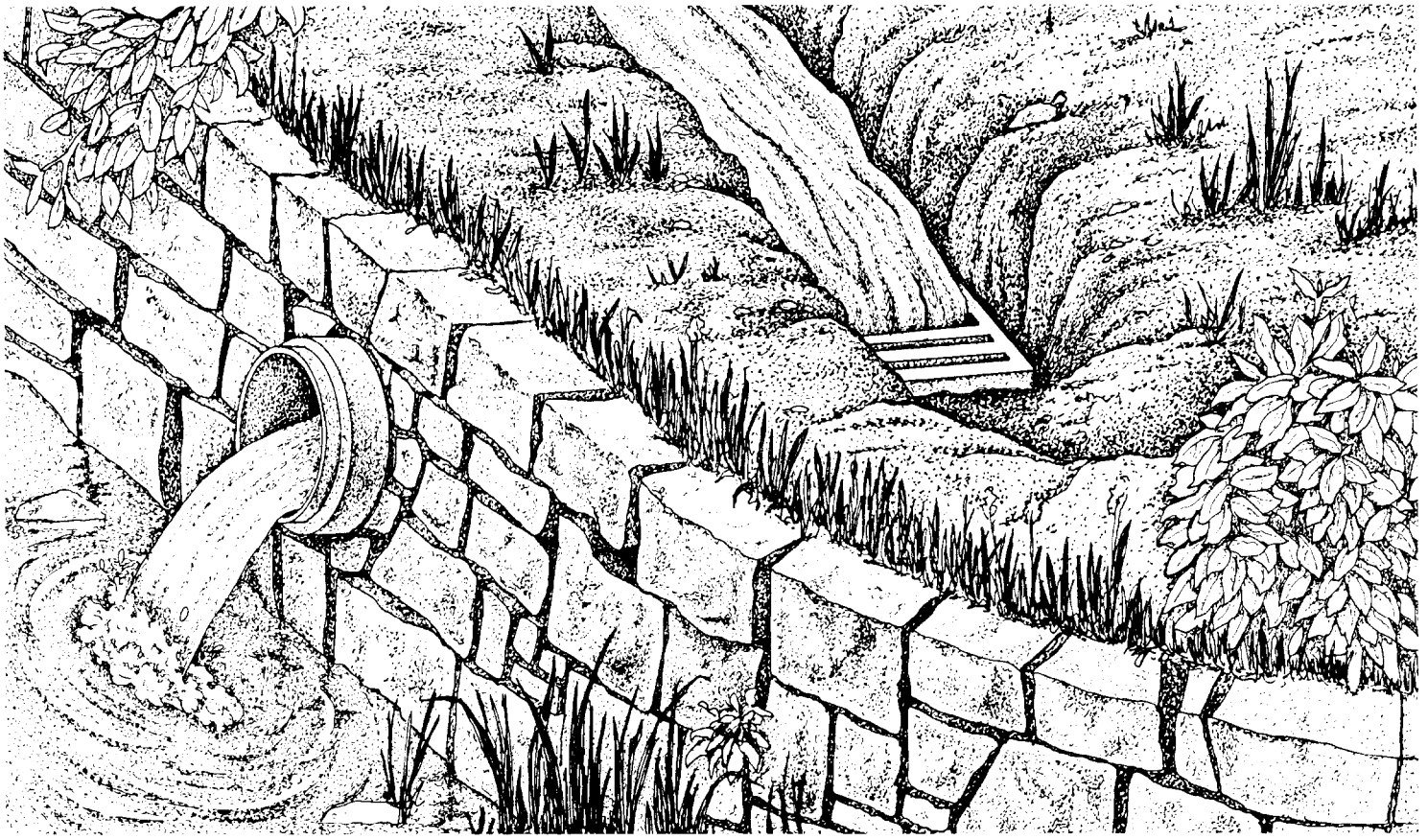
Fact Sheet 5

SOUND GARDENING

Gardening With an Eye on Water Quality

SOIL EROSION BY WATER



Erosion Hurts Your Garden and Long Island Sound

Driving rain and rushing water can carry away soil particles, organic matter, plant nutrients and pesticides. This **water–soil–chemical** mix finds its way to ponds, recharge basins, streams, storm sewers and ultimately Long Island Sound. Fine soil particles cause cloudiness in natural waters and excess nutrients may cause unnatural and ecologically disastrous blooms of algae. Pesticides, even in small quantities, may affect the health of fish and those who eat them.

Sound Gardening practices can help you control soil erosion and improve water quality.

The Sound Gardening approach is to prevent **soil** erosion, thereby reducing runoff and contamination of Long Island Sound by:

- planting ground covers, shrubs and trees to promote infiltration of water
- covering bare areas as soon as possible
- directing water across vegetated areas to promote infiltration.

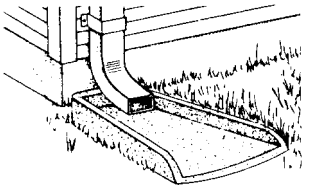
The Susceptibility to Soil Erosion Depends on:

Soil cover – type and percent of coverage
Soil type – the most erosion prone soils are silty or sandy
Grade – sloping areas are more likely to erode.

How to Spot Erosion

A gully is obvious evidence of soil erosion. Not all erosion is this easily recognized. Look around for these other signs:

* muddy or cloudy water in the driveway, roadway or gutter following rain or watering
* bare spots in lawns
* newly exposed tree roots (however, some species, such as maple. grow this way naturally)
* small stones or rocks appearing where none were before
* small rills or gullies beginning to show
* deposits of fine soils, usually in low lying areas
* soil splashed on windows and outside walls
* widening or deepening of stream channels
* fallen trees in stream channels
* cloudy or muddy appearance of surface water bodies (ponds. lakes. Long Island Sound).



Prevention and Remedies

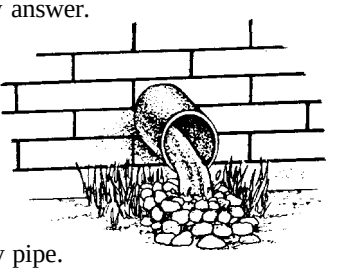
Redirect Water

Observe the flow of stormwater before considering vegetative control of erosion. Large amounts of soil can be carried by water as it gains speed on a slope. Structural means of redirecting water may be necessary when slopes are steep and erosion is severe. Diversions placed atop a slope or terracing throughout will slow the water, reduce erosion and allow for plant establishment. Professional advice may be necessary where land value is high or damage to property or life is possible.

Cover the Soil

Bare soil is the primary source of erosion. Re-establish vegetation as soon as possible wherever soil is exposed. Grass clippings, straw or any other temporary cover will reduce erosion until permanent vegetation can be established. In heavy traffic areas where plants cannot be used, a permanent mulch of stone, bark. woodchips or a hardened walkway may be the only answer.

Protect Vegetation



Protect vegetation where high water velocities are expected. For example, use a concrete splashblock at the rain gutter outlet and place stones at the outlet of any pipe.

Plant the Right Vegetation

Get the right kinds of plant varieties growing in the yard. When re-establishing vegetation, be certain that the soil, sunlight, drainage and moisture are adequate.

Observe what plants are growing in similar situations and use them. There are many species that lend themselves to erosion control:

autumn olive	turf grasses	crown vetch
honeysuckle	shore juniper	shrubby dogwood
sumac shrub	bird's foot trefoil	

Correct planting and good care will encourage quick establishment and cover.

REMEMBER

* Keep soil covered.
* Redirect water flow on slopes.
* Plant the right vegetation.
* Preventing erosion protects your soil and the Sound!

For more information on **Sound** ***Gardening and*** erosion, contact your local Cooperative Extension or Soil Conservation Service office.

In Connecticut:

Storrs:	(203)486–3435	Litchfield:	(203)567–9447
Fairfield:	(203)797–4176	Middlesex:	(203)345–45 11
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SOUND GARDENING

Gardening With an Eye on Water Quality

FRUIT AND VEGETABLE GARDENING

Gardening is a Wonderful Source of Food

We all enjoy fresh garden-grown fruits andvegetables. By using Sound ***Gardening*** techniques, it is possible to produce top-quality crops while maintaining soil fertility and protecting our natural waters.

> The *Sound* ***Gardening*** approach to fruit and vegetable gardening is to select disease-resistant species and varieties, to properly plant them in well prepared sites, and to minimize the use of chemicals.

Where to Plant

To get the most out of a garden, it is important to choose the right site. It should have a minimum of six hours of direct sunlight, have well-drained soil and be away from shade-casting trees. Plant the garden on level ground, avoiding sloping areas that are likely to erode.

If the garden has to be on an incline, plant across the slope. This way each row acts as a ridge to trap rainfall, reducing soil erosion.

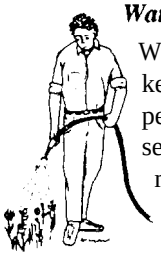
What to Plant

Fruit and vegetable plants need adequate sunlight, moisture, space, air, soil temperature, pH and fertility. A plant living in less than optimum conditions will not be as healthy as a plant growing under ideal conditions. Selecting varieties suited to your area and caring for them properly means better plant health and reduced maintenance. Check with a Cooperative Extension office for a list of recommended varieties. Healthier plants mean:

* more food from the garden
* less garden work
* less reliance on pesticides to deal with insects and diseases that take advantage of weak plants
* less potential for pollution and erosion.

Garden Care

Watering



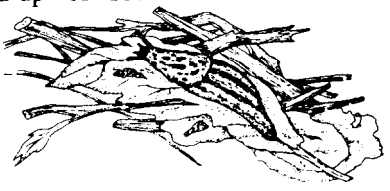
Water only when needed. Vegetable garden soil should be kept evenly moist. If nature does not provide 1" of rainfall per week, supplement with a single application during a seven day period. Some vegetable crops are naturally more deep-rooted and drought-tolerant than others. Generally. leafy crops and nightshade, tomato,pepper and onion family crops will need the most frequent watering. Root vegetables should also be kept evenly moist (no wet-dry fluctuation) to prevent woody roots. The application of mulching materials will reduce the need for additional water. Seeds and seedlings in the germination/establishment phase require more frequent watering as they need moisture closer to the surface.

Small fruits such as blueberries, strawberries and raspberries need adequate moisture (1" per week) at all times during the growing season. Full size fruit trees require less watering than dwarf fruit trees.

Pests

Serious pest problems can often be avoided by properly siting, planting and maintaining the garden. The following preventative measures will reduce the chance of pest invasion:

* Choose healthy vegetable transplants and disease-resistant fruit and vegetable varieties.
* Rotate crops when practical so the same or a related crop is not in the same place year after year. Repeated plantings of the same plants in the same spot can encourage insect infestation and the build-up of soil diseases.
* Practice good garden sanitation. Weeds, garden debris and other rubbish may harbor insects, slugs and diseases.



* Weed out volunteer vegetable seedlings such as tomatoes and squash. They compete with desired crops for water, space and nutrients.
* Time vegetable plantings to avoid peak pest infestations. Keep a record of when insect problems appear so you can plan future plantings.
* Inspect plants for insects and eggs frequently. Pick off and destroy any you find.
* Dislodge insects with frequent sprays of water. This may be all the control you need for aphids, whitefly, two-spotted mites and spittle bugs.
* Construct insect barriers over vegetable plants. Use screening or floating row covers (remove covers for insect pollinated plants when flowers appear).
* Protect fruit crops from birds with netting.
* Proper training and pruning of fruit trees may help reduce disease and insect problems.
* Monitor for slugs by trapping in containers of beer. They can also be lured beneath boards for capture.
* Keep the garden free of debris to limit hiding and breeding places for pests.
* Herbicides are unnecessary in a vegetable garden. Mulching around fruit and vegetable plants will keep down weeds, add valuable organic matter to the soil and reduce evaporation. Pull all weeds by hand before they get larger.
* If a pest problem develops, use the least toxic control method. Some of these might include *Bacillus thuringiensis*, insecticidal soaps and horticultural oil.

Fertilizer

Fertilizers supplement the nutrients already in the soil. Many people apply too much, which may damage plants, endanger water quality and waste money. When preparing the ground for vegetables in the spring, incorporate limestone (according to a soil test) and I to 2 pounds of granular fertilizer per 100 square feet. When using chemical fertilizers on established plants, apply in bands along rows of seeded vegetables or in a circle around each plant. This can improve yields and reduce the amount of fertilizer used.

A complete chemical fertilizer containing nitrogen, phosphorus and potassium in the ratios of 10-10-10 or 5-10-10 are the easiest and least expensive to use. They are readily available for plant uptake during the period of cool soil temperatures in the sprin;. However, organic sources of nutrients such as cottonseed, bone and blood meal, manures, compost, fish extract and other organic materials are available and may be used. As the percentage of nutrients in them is relatively low compared to chemical fertilizers, fairly large amounts may be required to supply plant needs.

REMEMBER

* Locate the garden where it is sunny and level.
* Plant disease-resistant, locally adapted varieties.
* Water only when needed.
* Use the least toxic pest control methods.

For more information on Sound Gardening and fruit and vegetable gardening, contact your local Cooperative Extension office.

In Connecticut:

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Fact Sheet 7

SOUND GARDENING

Gnrdening With an Eye on Water Quality

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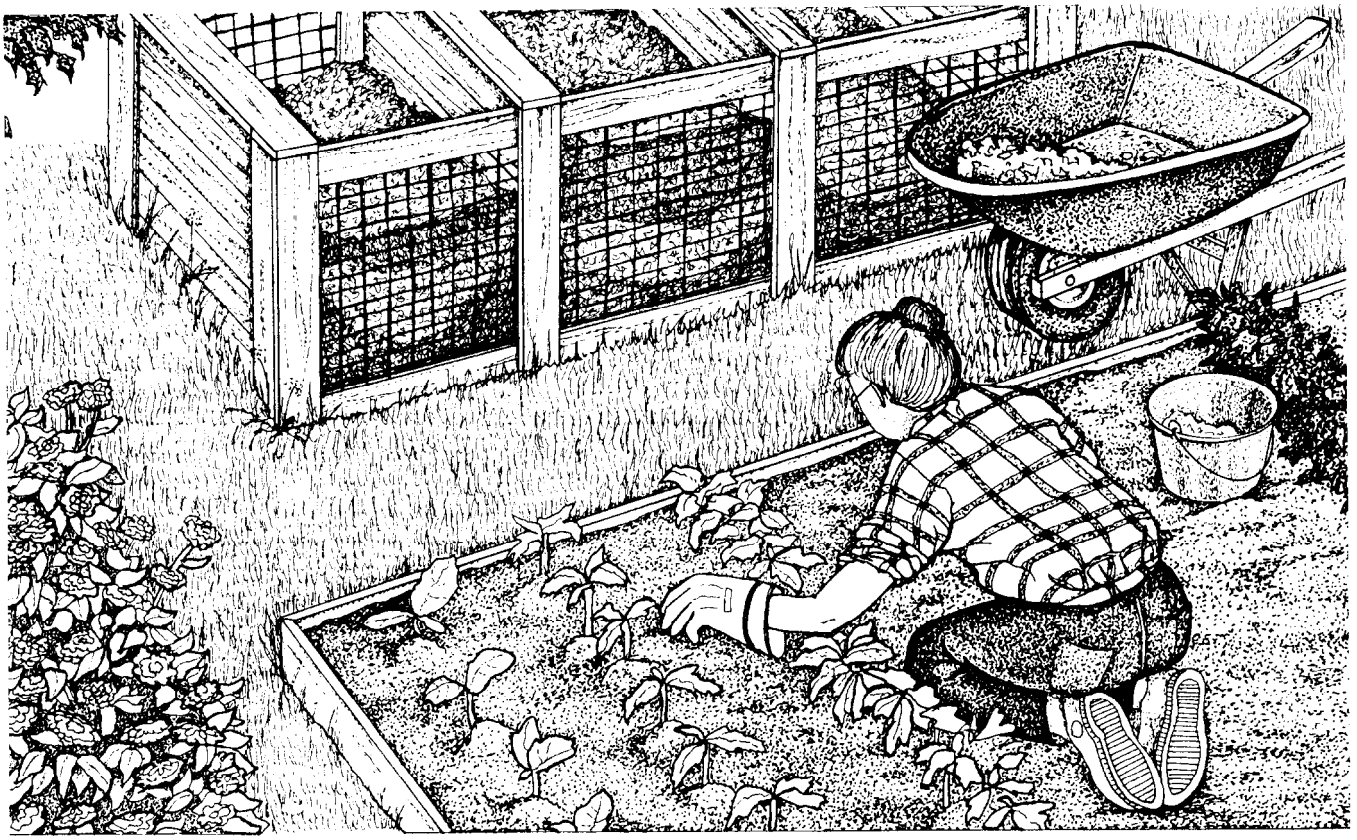
GARDEN WASTES



A Valuable Resource

Gardening creates waste (vegetable garden debris, leaves, twigs and branches, etc.) that can be converted by composting into a valuable resource.

> The *Sound* Gardening approach to garden and yard wastes is to compost them and reuse the end product as a soil amender. Compost provides organic matter and valuable nutrients for some of your fertilizer needs.

Keep Garden Waste Out of the Sound

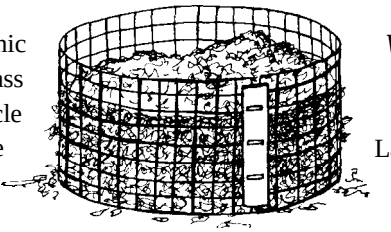
Dumping valuable and recyclable materials in Long Island Sound or a river, lake, stream, storm drain or recharge basin endangers the health of the water, plants and animals associated with the water systems, as well as our own fresh water supply.

Using Garden Wastes

Mulching

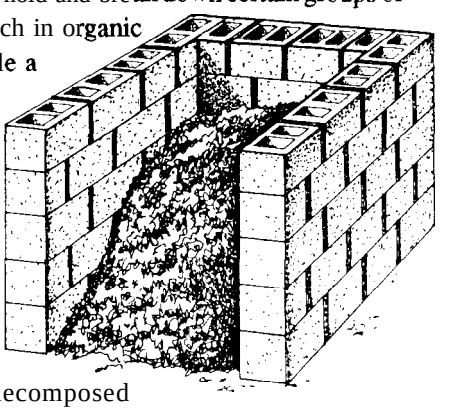
Yard waste such as leaves and wood chips can be used as a mulch. Adding mulch to your garden will conserve water, moderate soil temperature and reduce weed growth. Eventually, nutrients within the mulch will

be released and the decomposed organic matter will improve soil structure. Grass clippings are best left on the lawn to recycle their plant nutrients directly back into the growing grass. Improved recycling lawmnowers are now available to assist this process. Clippings do not contribute to thatch problems.



Composting

Compost. the end product of organic decomposition, can be used to improve the soil. Compost can loosen heavy clay soils by improving soil structure. This improves aeration and water infiltration. In sandy soils, water and nutrient holding ability will be increased (one pound of organic matter can hold up to seven pounds of water). The organic matter and its microbial populations will increase the soil's ability to hold and break down certain groups of pesticides. Soils rich in organic matter also provide a favorable environment for many beneficial organisms such as insects, worms and microorganisms.



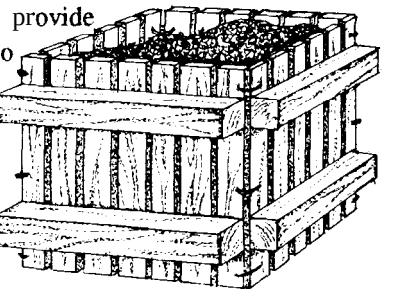
Partially decomposed compost can be used as a surface mulch to control weeds. However, when it is tilled into the soil prior to planting, it should be completely decomposed.

What Can Be Composted?

All organic materials are compostable. Large pieces (twigs, branches, stalks, etc.) should be chipped or shredded into smaller pieces to speed up the breakdown process. Shredding leaves is also a good idea; you could use a rotary mower.

Herbicide treated grass clippings, if collected, must be composted until completely decomposed (usually for at least a year) to eliminate potential secondary herbicide problems.

Diseased plant parts, as well as perennial weeds and weeds with seeds, should not be placed in a compost pile unless a large amount of organic matter is added at the same time. A large pile of properly managed decomposing biomass can provide high enough temperatures to kill many organisms.



A properly maintained compost pile will be odorless, pest and rodent free.

REMEMBER

* Yard wastes are a valuable recyclable resource that can improve the immediate surroundings without damaging any part of the environment.

* Using composted wastes to help improve soil will help with plant establishment and decrease soil erosion.

For more information on Sound *Gardening,* garden wastes and composting, contact your local Cooperative Extension office.

In Connecticut:				In New York:	
Storrs:	(203)486–3435	Litchfield:	(203)567–9447	Nassau	(516)454–0900
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SOUND GARDENING

Gardening With an Eve on Water Quality

SOIL AND FERTILITY

Protect the Soil

Soil is the essential foundation for all higher plants. Its fertility, pH (measure of acidity), moisture content and physical qualities determine how well it will support plant life. Understanding and caring for the soil will produce a healthier, more productive garden.

> The *Sound Gardening* approach to soil fertility is to have your soil tested and apply fertilizers and limestone only in the recommended amounts. By minimizing excess applications, your soil will sustain healthier plants and any impact on water quality will be minimized.

Know Your Soil

Drainage

Drainage is the ability of water to flow through the soil. Water and dissolved chemicals move quickly through coarse textured, sandy or gravely soil. Fine textured silt and clay soils and soils high in organic matter slow down the flow of water. These soil types provide sites to which plant nutrients and other chemicals can adhere.

Well drained soils that are at least two feet deep are the most suitable for all types of gardening. Soils with a high water table or those with a shallow hardpan layer will have more problems and may require site management and/or modification.

Fertility

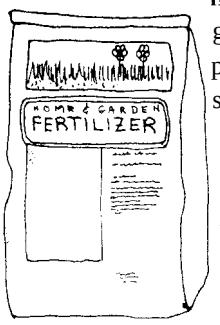
Minerals necessary to support plant life, are supplied from organic and inorganic sources. The complex chemical processes that supply plant nutrients are affected by the soil environment – moisture, temperature, pH and types of microorganisms present.

Improper application of fertilizer, including organic fertilizer, can result in loss of nutrients by surface runoff to

nearby streams, lakes, rivers or the Sound or by percolation into the groundwater. Applying too much fertilizer can:

- waste money and time
- damage plant roots
- increase susceptibility to diseases
- encourage weed growth
- pollute surface and groundwater
- stimulate unwanted growth.

To avoid overfertilization. have the soil tested through Cooperative Extension. Testing will give the level of primary plant nutrients and pH, recommended fertilizerrates to correct any deficiencies, and wam of excessive nutrient levels. It is important not to exceed the suggested rates.



Complete chemical fertilizers, containing nitrogen, phosphorus and potassium or organic sources of plant nutrients (cottonseed and bone meal, manures, compost, etc.) are available and may be used to supply needed nutrients. Because the percentage of plan; nutrients in most organic material is relatively low compared to chemical fertilizers, large amounts may be required to supply the needs of plants.

Properly timed annual or semi-annual applications of fertilizer are more beneficial to the plant's health and are less likely to cause environmental damage than infrequent, heavy, ill-timed applications.

Woody plants, as a general rule, produce an abundance of roots in the spring as the soil warms. Depending on how stressful summer weather conditions are, additional root growth will occur in the fall as the soil cools. Contolled release fertilizers can be applied in the spring or late fall if the soil has sufficient moisture. A fertilizer containing nitrogen in a slow-release form is usually recommended for fall fertilization. Avoid fertilizer application to dry soil and when soil temperatures are below 40°F.

Trees and shrubs growing in or bordering a regularly fertilized lawn will usually not need separate applications of fertilizer. Plants not putting on adequate growth or having poor foliage color may be suffering from a disorder rather than lack of nutrients. Always locate and remedy the primary cause before applying fertilizer to possibly aid in the plant's "road to recovery." Recently-installed woody plants may respond to a fertilizer application if nutrient levels are low. Usually, phosphorus is lacking. In sandy soils, nitrogen may also be in short supply.

Avoid fertilizing woody plants from mid-June through September to avoid late flushes of tender growth that will not harden off properly before winter sets in. This tender growth could be injured or killed at low temperatures, providing entry for disease during the next growing season.

Nutrients that run off in the surface water will eventually reach the Sound. High nutrient levels may cause unnatural and sometimes disastrous algae blooms. Plant nutrients or chemicals leaching into the groundwater can contaminate drinking water for this and future generations.

Conditioning

Productivity and workability of the soil can be greatly improved by mixing in suitable decomposed organic matter. This will improve the water and nutrient-holding ability of the soil, buffer temperature changes and prevent rapid fluctuations in the pH. With increased microbial activity, the breakdown of many pesticides will be aided. Because of the chemical activity associated with organic matter, bonding sites in the soil matrix will be provided for some pesticides, thus preventing their movement into the groundwater.

REMEMBER

* Fertilize according to what the plant needs.
* Do not overfertilize.
* Time application correctly.
* Add organic matter to improve soil structure.
* A healthy soil contributes to a healthy environment.

For more information on ***Sound Gardening*** and soil fertility, contact your local Cooperative Extension office.

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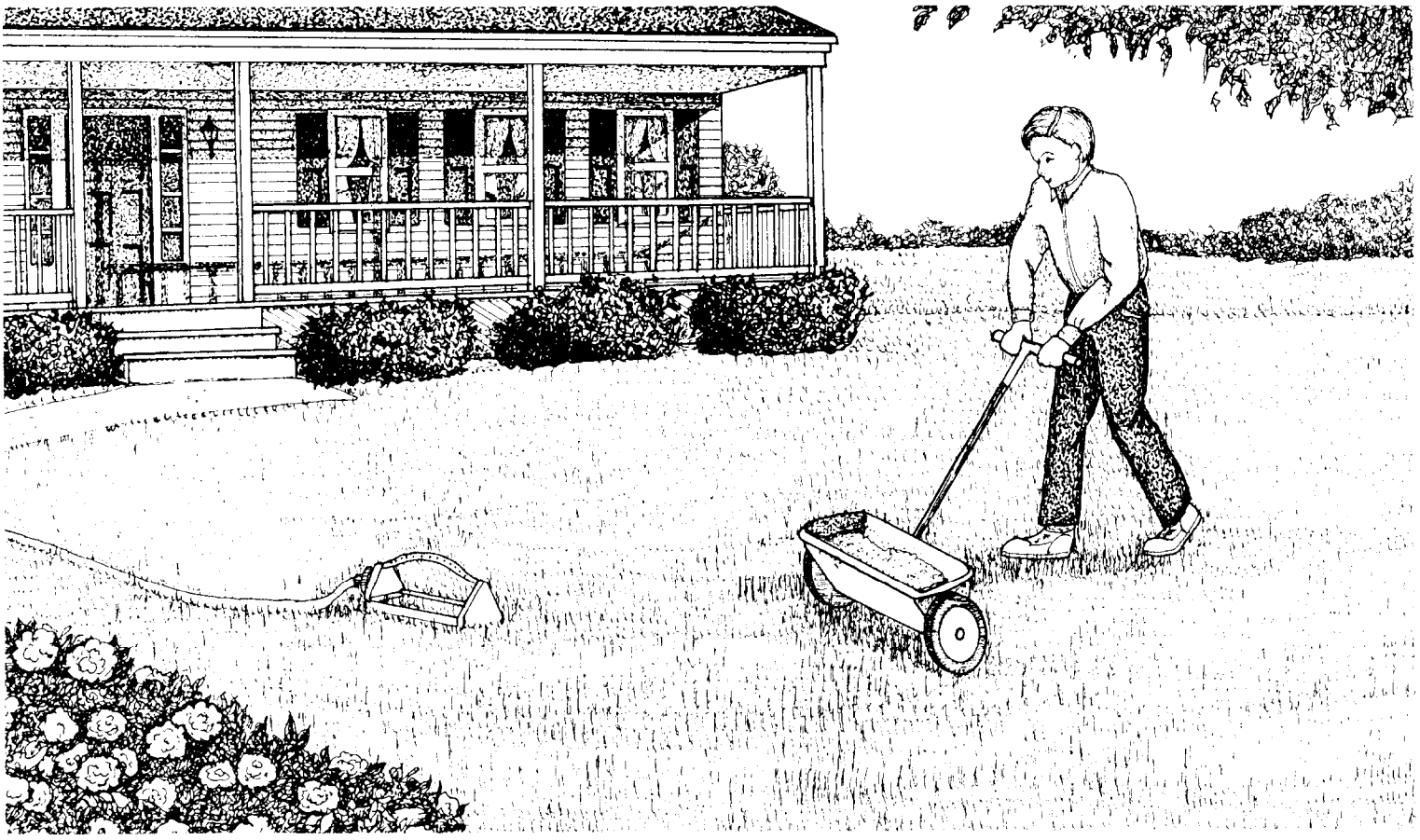
Fact Sheet 9

SOUND GARDENING

Gardening With an Eye on Water Quality

LAWNS



If You Have a Yard, You Probably Have a Lawn

Most lawns do not have to be meticulously managed to be healthy and look good. Selecting the right species and varieties, fertilizing 1 to 3 times per year, proper mowing and thatch management and timely summer watering contribute to keeping the lawn healthy.

Some gardeners, in an attempt to achieve a perfect lawn, may use excessive amounts of fertilizers and water and/or improperly use pesticides. Over-fertilization is a waste of money and may pose a hazard to the environment. The Long Island Sound Study found excessive nitrogen exacerbates summertime low dissolved oxygen levels in the Sound's waters. Many of the newer grass varieties retain good green color with reduced amounts of fertilizer and, in many cases, less water.

The Sound Gardening approach to lawns is to use insect, disease and drought-tolerant grasses that require less chemicals and water, thereby providing for a more chemical free environment.

* Manage lawns properly to minimize the need for pesticides.
* Do not overfertilize.
* Always use slow-release fertilizers.
* A healthy. dense lawn will help reduce weed invasion and is the best defense against pesticide and fertilizer runoff into Long Island Sound.
* Use grasses with known tolerance to insects, disease and drought.
* When using pesticides. always follow the label instructions and precautions.

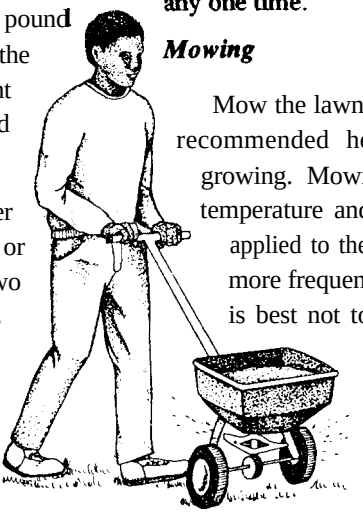
Establishment

Planting recommended species and varieties for your area will go a long way toward preventing problems. Tall and fine-leaf fescues are considered low maintenance grasses and generally require less water, fertilizer and pesticides. Selected varieties of perennial ryegrasses and Kentucky bluegrasses also perform well under low maintenance conditions. Some perennial ryegrasses contain beneficial fungi called endophytie fungi that render those varieties resistant to certain turf insects such as chinch bugs and sod worms. Check seed packages to see if they contain endophytic fungi.

Fertility

Maintain the proper level of soil fertility and avoid over-fertilization by following soil test recommendations. It is best to use slow-release types of nitrogen. Do not apply more than one pound of actual nitrogen per 1,000 square feet at one time. To determine what one pound of actual nitrogen is, divide the first number on the fertilizer bag into 100. The result is the amount (in pounds) you should take out of the bag and apply over 1,000 square feet of lawn.

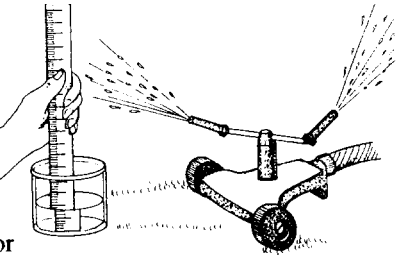
The number of applications of fertilizer per year is best determined by turftype. Where fine or tall fescue-type grasses predominate, one to two applications are suggested. The bluegrasses generally require three applications. Recommended application times coincide with three different boliday periods: Memorial Day, Labor Day and Thanksgiving.



Amount of Fertilizer to Use
(for each application on established lawns)

% Total Nitrogen	Lbs Fertilizer/l,000 square feet (as listed on label)
4	25
5	20
6	17
7	14
8	12 112
9	11
10	10
20	5
25	4

Water



Most lawns requite about one inch of water per week, either in the form of irrigation or natural rainfall. Some factors influencing the amount of water needed are: grass and soil type, amount of rainfall, relative humidity and wind speed. If you see the shape of your footprints in the lawn when you walk across it, it's past time to water (provided the grass isn't too long).

Limestone

Have a soil pH test done to determine how much limestone the lawn needs. Proper pH, 6.2 to 6.5, can enhance the grass' ability to take up valuable fertilizer, tolerate drought conditions and resist diseases. Limestone can be applied at any time of the year when the ground is not frozen. It is generally recommended that no more that 100 pounds per 1,000 square feet be applied at any one time.

Mowing

Mow the lawn throughout the growing season at the recommended height for the species of turfgrass growing. Mowing frequency is determined by the temperature and the amounts of water and fertilizer applied to the lawn. The more fertilizer applied, the more frequently the lawn will have to be mowed. It is best not to remove more than one-third of the grass plant at any one time. Clippings can be left where they fall if they are less than one inch in length. This will reduce the amount of fertilizer needed

by 25%, since turfgrass clippings contain nutrients that are released back to the soil. If clippings are too long, add them to the compost pile. Mower blades should be kept sharp as dull blades can fray grass tips, giving the lawn a whitish-brown appearance.

Mowing Heights
Turf-type tall fescue – 2 1/2" – 3"
Perennial ryegrass and fine-leaf fescue – 2" – 2 1/2"
Kentucky Bluegrass – 2" – 2 1/2"

Aeration

Some areas in our region have clay soil or soil that has been poorly managed or compacted. This creates a hardened, poorly drained and aerified soil. Aerating this type of soil can be of some benefit as it will allow oxygen and water to get to the grass' roots. Spring or fall is the best time to aerate. If the compacted soil layer is more that three to four inches thick, aeration is of little value because most aerifiers do not penetrate below four inches.

De-Thatching

Heavy thatch restricts water movement into soil. Some species such as the fine fescues and Kentucky bluegrass produce thatch; others such as tall fescues and perennial ryegrasses do not. De-thatching is recommended for lawns with 1/2 or more inches of thatch and should be done in the fall. It is wise to use a de-thatching machine that has fixed blades rather than a machine with blades that flip back and forth because the latter will not reduce the underlying thatch layer and will damage the lawn. To deal with thatch, soil cores can be broken and spread on the lawn. If thatch is over 1 1/2" thick, total renovation is recommended.

Insect, Disease and Weed Control

The best tool for pest management is to plant grass varieties that tolerate the region's growing conditions and have the greatest resistance to insects anddiseases. If you have a problem, take time to find out:

- what is the problem?
- what is the potential for damage?
- what is the best approach to solve the problem?

Avoid applying pesticides according to pre-determined calendar schedules. An exception is if you have had the problem each year and a pesticide application is the only means of control (such as for turf grubs). Begin checking for these insects in April. Insecticides should be used only when the number of pests is high (i.e., 5 grubs per square foot of healthy lawn). When treatments are necessary, they should be chosen and timed to be the most effective in dealing with the specific pest and the least disruptive to natural controls. This information can be obtained from Cooperative Extension.

REMEMBER

* A dense healthy lawn is the best defense against weed invasion.
* Look for alternatives to grass in some areas of the yard. It will mean less work, a more interesting yard and a cleaner Long Island Sound.

For more information on ***Sound Gardening*** and lawns, contact your local Cooperative Extension office.

In Connecticut:

Storrs:	(203)486–3435	Litchfield:	(203)567–9447
Fairfield:	(203)797–4176	Middlesex:	(203)345–45 11
Hartford:	(203)24 I-4940	New Haven:	(203)789–7865
Tolland:	(203)875–3331	New London:	(203)887–1608
Wiidham :	(203)774–9600		

In New York:

Nassau	(516)454–0900
Suffolk	(5 16)727–7850
Westchester	(914)682–3072

Sound Gardening was made possible through the combined efforts of Cornell Cooperative Extension of Nassau, Suffolk, and Westchester Counties, University of Connecticut Cooperative Extension System, and the Sea Grant Programs of New York and Connecticut. Artwork by Susan Stone.

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SOUND GARDENING

Gardening With an Eye on Water Quality

HERBICIDES AND WATER QUALITY

Caution is Required With all Herbicides

Almost all pesticides we use on our lawns and landscapes or in our gardens can be damaging if they are not used exactly as their labels state. Improper application or spills may not only damage desirable plants, but careless use can la harmful to beneficial organisms like birds and bees.

Pollution of ground and surface water can be a possible problem when chemicals are used incorrectly. Water quality is now a malter of national concern. Everyone must play a part to keep our natural waters clean and healthy.

> The ***Sound Gardening*** approach to herbicides is to minimize applications by using only what is needed at the proper time and in correct amounts.

Everyone Lives on a Stream

Herbicides are used to control unwanted plants in yards by applying directly to the target weeds. Because of

their potential to contaminate, they should be used carefully. Everyone gardens over groundwater and lives on a stream, whether there is one flowing through the backyard or not. Water that flows off your property is carried into drainage ditches or storm sewers. The water eventually flows into Long Island Sound or other coastal waters.

Potential to Pollute

Whether a herbicide has the potential to find its way into ground or surface water is dependent on a number of factors: the chemical's solubility (whether it readily dissolves in water): its adsorptive qualities (how tightly it can bind to clay and humus particles in the soil); and its degradation (how fast soil microbes or other factors break it down into harmless components).

Factors to Consider

Other factors that influence a herbicides' behavior and effectiveness are:

- soil texture
- slope or grade of the land where it is used
- the proximity of the groundwater to the soil surface
- the presence and depth of hardpans and other impermeable layers
- amount and timing of rainfall or irrigation following application.

Texture refers to the amount of sand, silt or clay that makes up a soil. Soils that contain a fair amount of clay are less likely to allow rapid movement of chemicals through them. Both clay particles and humus or other organic matter help to bind many herbicides, retaining them in the soil. This minimizes contamination of ground or surface waters. However, erosion or surface runoff may carry panicles of clay, with their tightly-adsorbed herbicides, to Long Island Sound or other surface water bodies. Fortunately, high quality lawns and properly landscaped yards will prevent runoff.

Many chemicals are broken down by soil microbes, while others are decomposed by sunlight in a process called photodecomposition. Those that are degraded quickly will have less of a chance to contaminate water supplies. If herbicides are the only option left to solving a problem in the lawn or garden, be sure to follow the label closely, applying only what is needed. Since each herbicide was developed for a specific weed, proper application rates and timing with regard to weed growth stage and calibration of equipment are all essential to eliminating the problem and preserving water quality. Check with your local Cooperative Extension office for advice on which herbicides to apply for specific problems.

REMEMBER

* Apply herbicides only when absolutely necessary.
* Herbicide choices can impact water quality.
* Good garden and lawn maintenance minimizes the need for herbicides.
* A dense healthy lawn will help prevent runoff.
* Proper application rates and timing will improve the herbicide's effectiveness and protect water quality.
* Avoid overwatering your lawn.

For more information on Sound *Gardening* and herbicides, contact your local Cooperative Extension office.

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