beneficial insects are not destroyed in error. Drowning insects in water is an alternative to squashing them.

- Resistant Plants: Plants that are native to this area are often more resistant to pests and climate, etc. than are introduced plants. Many plant cultivars have been developed which are resistant to such diseases as verticilium wilt and peach leaf curl.

- Growing Conditions: Plants, such as hostas, that require some shade are more susceptible to pests when they are grown in sun. Plants that are not properly fertilized or watered are less vigorous in growth and tend to attract pests. Plants that prefer an acid soil, such as azaleas, will perform better and be less susceptible to pests when they are grown in soil with the proper pH.

- Chemicals: Chemicals are a small part of the entire IPM plan and should be applied only as needed after reviewing all other alternatives.

Pesticide management

1. Know what pest you are spraying for. Use the pesticide according to the manufacturer's instructions and buy only the quantity needed. Many pesticides have a limited shelf life and may be useless or degrade into even more toxic compounds if kept on the shelf.

2. Do not apply more than the specified amount. Overuse can be dangerous to your health as well as the health of wildlife and the environment. If more than one chemical can be used to control the pest, choose the least toxic. The word "caution" on the label means that the chemical is less toxic than one that is labelled "warning."

3. Do not spray on windy days, in the morning of what will be a very hot day, or when rain is likely to occur. Herbicides can drift and injure valuable ornamental plants in either your or your neighbor's back yard. Do not water heavily after application. Plants should be lightly watered BEFORE application to prevent burning of the foliage.

4. Never apply pesticides near streams, ponds, or wetlands. Do not apply them to bare or eroded ground. Many pesticides bind to soil particles and can be easily carried into a stream or storm drain.

5. Pesticides should be stored well away from living areas. Ideally, the storage area should have a cement floor and be insulated from temperature extremes. Always keep pesticides in their original containers with labels intact. Labels often corrode and become illegible in this climate and may have to be taped onto the container.

6. Federal law now requires that all pesticides be labelled with the appropriate disposal method. Leftovers should never be dumped anywhere, including a landfill. Many counties in this area conduct hazardous waste collection days or collect waste regularly at the landfill. Contact the county environmental health department for more information.

7. Empty containers should be triple-rinsed and the leftover rinse water used as spray. Once containers are triple-rinsed, they are not considered hazardous waste and may be disposed of in most landfills. However, call your local landfill before putting the container in the garbage.

8. If a pesticide is spilled onto pavement, it can be absorbed using kitty litter or sawdust. The contaminated absorbent should be bagged and labeled and taken to a hazardous waste collection site. If the pesticide is spilled onto dirt, dig up the dirt, place it in a plastic bag and take it to a hazardous waste collection center.

9. Many pest control companies and licensed applicators have access to pesticides that are more toxic than those available to the consumer. Check with the company before they spray indoors or outdoors to find out what spray they will be using and what precautions, if any, are necessary after the operator leaves.

HOME REMODELING

Remodeling uses some of the most toxic substances found in the home. Paints, preservatives, strippers, brush cleaners, and solvents all contain a wide range of chemicals, some of which are suspected to be carcinogens (cancer-causing). These products should never be dumped in a landfill or put down a sewer or septic system.

1. When building a deck consider using wood instead of concrete. Wood decking allows rainwater to drip onto the ground below, keeping it from becoming surface runoff.

2. Decks and sidewalks can also be built out of brick interlocking pavers or modular concrete. If these surfaces are placed on a bed of well-drained soil, gravel or sand, rainwater can infiltrate into the ground through them.

3. To reduce disposal problems, buy only the amount you need. Used turpentine or brush cleaner can be filtered and reused. Paint cans should be allowed to dry and then be disposed of during a hazardous waste collection day or at a permanent collection location.

4. Large amounts of leftover paint can be given away, for example to a theater group. Currently, the City of Seattle is experimenting with recycling latex paint turned in as hazardous waste. It is blended, cleaned, tinted, and is now being sold on a trial basis as "Seattle Beige."

5. Roof downspouts can be adapted to infiltrate runoff where the soil is well drained. The runoff from them can enter a gravel bed where it can infiltrate into the ground. For design criteria, see BMP RI-15, Roof Downspout Systems in Volume III of the Stormwater Management Manual for the Puget Sound Basin.

6. When gardening on slopes, reduce the potential for surface runoff by using terraces across the face of the hill. These can be as simple as little soil "bumps" or can be elaborate using such products as pressure-treated wood 4x4s or rock walls.

SEPTIC SYSTEM CARE AND MANAGEMENT

While septic systems do not seem to have a direct relationship with stormwater runoff, they can in some instances be related.

1. Roof drains and stormwater runoff should be diverted away from drainfields. Excess water reduces the capacity of the drainfield to absorb effluent from the septic tank.

2. Water from hot tubs should not be drained into a septic system all at once. They are not designed to handle large volumes of chlorinated water. Either use the water on plants in the yard, or drain the hot tub slowly over a period of days.

3. Septic tank tanks should be pumped regularly. Ponded water, damp places in the yard, foul odors and/or a dark gray or black soil color may indicate septic drainfield failure. Effluent from a malfunctioning septic tank can cause disease and nitrate problems in groundwater.

LARGE ANIMAL MANAGEMENT

People often own livestock in low-density residential areas. Horses are the most popular animal, but goats, cows, sheep, llamas, pigs and chickens are also kept. Nearby streams and lakes can be adversely affected by manure-contaminated stormwater draining from pastures. Overgrazing, a common problem, denudes pastures and allows excessive runoff and erosion. Contamination frequently occurs when animals defecate directly into a lake or stream. Streambanks can also be broken down.

It is essential for livestock owners to install BMPs similar to those described below. Not only will they help in controlling water quality, but they will help maintain productive pastures by increasing the grass cover and reducing erosion.

Pasture management

1. Pastures should be fenced to keep animals away from surface water. If stock must be watered at a stream, use a ramp-and-fence system to keep them out of the water (Figure 1). A minimum 10-foot strip of vegetation should be left between the fence and the water.

2. If the buffer area around the water cannot be fenced, it should be planted with a "living fence," vegetation that is impenetrable to livestock. The buffer strip should be at least 25 feet wide. Consult with local government for any other restrictions and/or the restrictions contained in a Sensitive Areas Ordinance, if passed.

3. Avoid overgrazing. Restrict grazing during the winter months when grasses are dormant and easily overgrazed. Grazing when the soil is wet can cause compaction

of the soil and can result in reduced plant growth, erosion, and contamination of surface water.

4. If animals must be kept in a pasture over the winter, a small "sacrifice" area should be used for feeding and watering. This will limit the amount of land disturbed and reduce the area of pasture that will need reseeding. The sacrifice area should be located away from streams or standing water. Portable electric fencing can be used to keep the animals in this temporary area.

5. Always limit the number of animals pastured based on the amount of land available and pasture productivity. The local Conservation District can offer advice on the proper stocking rate for your land. The smaller the acreage grazed, the greater the chance for vegetative destruction, even when hay is provided.

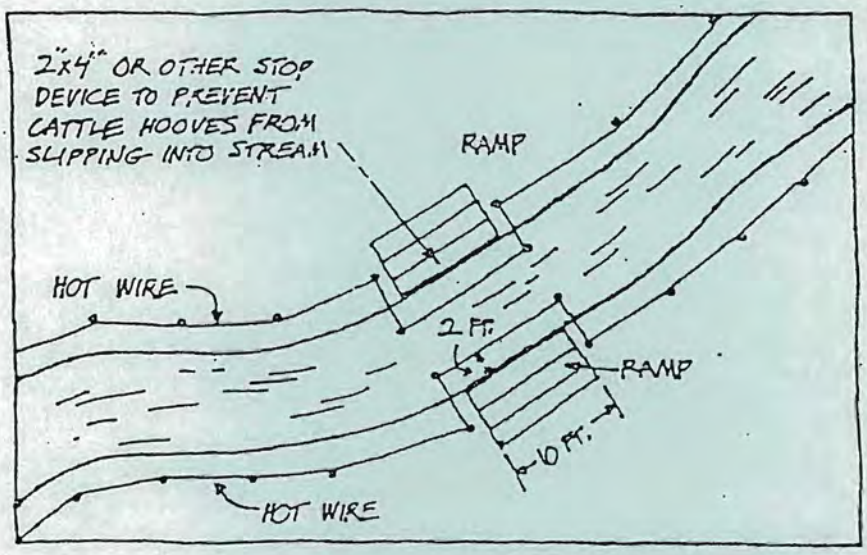
6. Intensive livestock use may necessitate reseeding of a pasture every two to three years to optimize production and minimize the chance of erosion. Ideal renovation entails plowing the pasture and sowing an annual crop such as corn, oats, or annual rye grass for one year and reseeding again the following year. Animals should be kept off the new seeding for the first year. Fields may be hayed towards the end of the first growing year.

7. If planting an alternate crop for one year is not possible, some coverage and plant species improvement can be achieved by disking the pasture and reseeding.

8. Overgrazing can also be avoided by dividing the pasture into three or more units and establishing a grazing rotation period that allows foliage three to four weeks of regrowth between grazing periods. A portable electric fence can also be used in this situation.

9. The Soil Conservation Service and the County Conservation District can provide growers with details of these practices.

Figure 1



Animal waste management

1. Manure should be collected regularly and stored. The storage site should be an area well away from creeks, ditches, marshes, and ponded or flowing water, where off-site runoff cannot mix with manure and where seepage from manure cannot enter surface water.

2. Stored manure should be covered with either a roof or plastic sheeting to prevent the entry of rainwater. Rooftop runoff from the manure storage area should be diverted away from the storage area by using gutters and downspouts. This clean water can be infiltrated back into the ground to recharge ground water. BMPs III-RI-15 and III-RI-16 in Volume III of the Stormwater Management Manual for the Puget Sound Basin give design criteria for roof downspout infiltration systems.

3. Small watercourses adjacent to the manure storage area should be redirected or enclosed. To do any work in or on streambanks, a short-term water quality modification permit or a hydraulic permit approval may be required.

4. Concrete slabs with walls or curbs will provide the most control for manure storage. The storage area should be designed so that liquid wastes are retained and directed to a liquid storage area.

5. Manure may be given away, or used as fertilizer on seeded pastures.

REFERENCES

Puget Sound Water Quality Authority, Managing Nonpoint Pollution - an Action Plan for Puget Sound Watersheds, 88-31, June, 1989.

Washington State Dept. of Ecology, Water Quality Guide - Recommended Pollution Control Practices for Homeowners and Small Farm Operators 87-30, revised June, 1991.

Washington State Dept. of Ecology, Hazardous Waste Pesticides, 89-41, August, 1989.

Washington State Dept. of Ecology, Turning the Tide on Toxics in the Home, 1989.