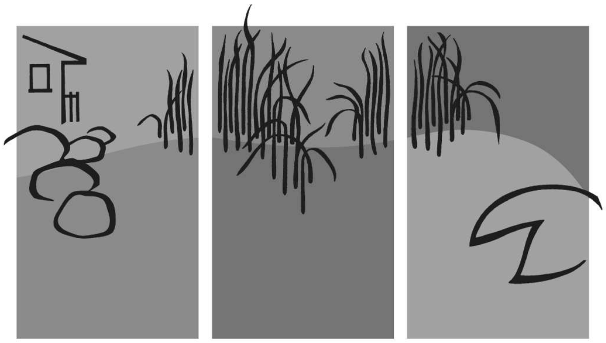


From Shore to Shore

"For Minnesota citizens promoting the health of our rivers and lakes"

on the web at www.shorelandmanagement.org/citizen/index.html

Newsletter 57
May 2004

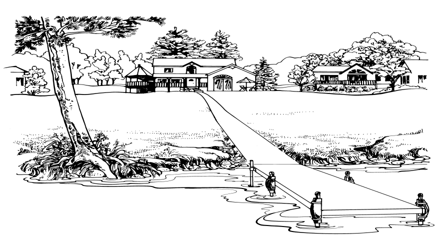
Calendar of Events

Maintenance for Shoreland Revegetation Workshops
July 9, 2004 — Pequot Lakes
July 23, 2004 — Grand Rapids

Wetland Plant Identification
July 30 & 31, 2004—Eagan
August 5 & 6, 2004—Nisswa

Aquatic Plant Identification
July 15 & 16, 2004—Eden Prairie
July 19 & 20, 2004—Alexandria

For more details of these and other shoreland workshops, including registration options and fees, visit: www.extension.umn.edu/water/shore



Starter Castles and McMansions: Shoreline Development in Lake Country — What is the Answer?
May 20, 2004—3 p.m., MPCA,
7678 College Road, Suite 105, Baxter
For information contact Stephen Mikkelson, MPCA-Brainerd , (800) 657-3864

Learn About Raingardens
May 25, 2004—7 p.m., Sauk Centre
Junior High School Auditorium
For information, contact the Sauk River Watershed District, (320) 352-2231

Governor Pawlenty's Clean Water Initiative North Central Lakes Pilot Project

The North Central Lakes Pilot Project, one of Governor Pawlenty's Clean Water Initiative projects (established in 2003), includes Aitkin, Cass, Crow Wing, Hubbard, and Itasca counties. In these counties, which host 21 percent of the state's lakes, and the population is booming with growth rates of 23 and 24 percent, compared with the statewide population growth of 12 percent, impacts from human activities to water quality and habitat are of concern.

Because of the popularity of area lakes, increased development is a given. However, development is possible without causing serious impacts to the very resources (the lakes) that bring people to the area. The pilot project includes seven major objectives that all have solution-oriented work plans. "We are optimistic," said John Stine, project coordinator, "because support for lakes stretches from cabins to the Capitol. We have the right people working together on these projects. People know our quality of life is linked to the quality of our lakes."

Projects include:

- Updated shoreland rules will give local government officials more options and alternatives when making land use decisions.
- Conservation easements will allow property owners to direct future use of cherished lands while providing potential tax deductions in the short term.
- The Healthy Lakes and Rivers Partnership program helps citizen leaders develop and implement their own lake or river management plans and measure success.
- The Brainerd Lakes Area Conservation Collaborative (BLACC) offers long-term strategies that balance development and conservation.
- A regional sanitary district will be considered along with a wastewater management plan, capital improvement plan, and district-wide on-site inspections.
- The land use and water quality education project will improve lake management by providing water quality management education and project opportunities for local officials, housing industry professionals and the public.
- The lakes technical team will help define the technical aspects of the projects, provide technical assistance, and report on results.

For further information, please contact Eleanor Burkett, University of Minnesota Extension Service Regional Center, Brainerd, (888) 241-0720, or burke044@umn.edu.

Impervious Surface – An Environmental Indicator

Impervious surfaces are one result of community growth that can be directly measured. It is an important indicator – an understandable measure of our surroundings. It is used to show changes in environmental conditions and to gauge the health of our natural resources. This article discusses the relationship between impervious surfaces and urban land uses.

Urban uses change the local water balance. As is illustrated in Figure 1, removal of natural land cover disrupts the water balance. Imperviousness changes the routing and timing for water to reach a lake or stream. Trees, shrubs and grasses are natural land covers. They shelter the soil surface from rain, wind and surface erosion, intercept precipitation, and filter rainwater. When rain reaches the ground, leaf litter and shallow roots are there to absorb it, as if they were a sponge, thus recycling the rainwater. Some rainwater eventually evaporates into the atmosphere. This absorption and recycling is called evapotranspiration. Natural land covers encourage the movement of rain that has soaked into the ground into wetlands, lakes and streams. This movement of water is called “interflow.” Natural vegetation also enhances deeper water movement, or “base flow.” At the latitude and climate of our nearby state, Wisconsin, the cumulative evapotranspiration generally accounts for around 70% of the total amount of the annual precipitation. Another 13% becomes stream flow and 17% groundwater (Steuer and Hunt, 2001).

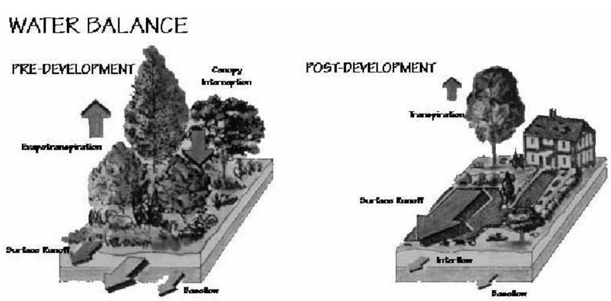


Figure 1: Water Balance Illustration. Source: Center for Watershed Protection

Land use consists of many different land covers. Some do not soak up water (impervious) while others do (pervious). For example, impervious roofs, driveways and sidewalks along with pervious lawns, flower gardens, trees, and shrubs define residential land use. Compacted lawn and agricultural field soils are a middle ground between hard, impervious surfaces and spongy natural land covers. Where a parking lot may be 95% impervious, a residential lawn may be 40% impervious and natural land covers are nearly zero (Anacostia, 1991).

Several studies have estimated imperviousness for different urban land use categories. The table below summarizes two such studies. The percentages estimated in the studies reflect the general urban use category, but each community should determine values that truly reflect their specific situation.

Table 1: **Urban land uses and imperviousness**

Land Use	**Ultra Urban Connected Impervious Cover[1]**	**Chesapeake Bay Results[2]**
High Density (lots < 0.5ac.) Residential	41%	33%
Multiple Family Residential	49%	44%
High Rise Residential	64%	--
Schools	39%	34%
Industrial	69%	53%
Commercial (strip malls and office parks)	83%	72%
Shopping Center	92%	--
Downtown Commercial	96%	--

The unintended results of large percentages of impervious surfaces in urban areas include:

- Removal of natural storage, retention, and recycling of precipitation.
- Significant increases in overland runoff into surface waters.
- Decreases in stream base flow and groundwater recharge.
- Widening of stream channels.
- Increases in floodwater velocities.
- Increases in the magnitude and frequency of flooding.
- Stream morphology changes because of the altered hydrology (Anacostia, 1991).

In urbanizing communities, impervious surfaces have replaced roots, leaf litter, and forest canopies that were once available to absorb and recycle precipitation.

Impervious Surface... continued

Where precipitation was once able to percolate into the ground and infiltrate to the water table or contribute to stream and lake base flows, now most precipitation runs off directly into our wetlands, lakes, and streams. Natural processes are no longer available to absorb and recycle rainwater and snow melt.

Under natural conditions, overland runoff is a relatively minor component of the water balance. Urbanization suddenly makes runoff a significant and probably the most visible component of the hydrologic cycle. The absolute change resulting from a single parking lot may not seem significant, but the cumulative impact of several parking lots, roof tops, roads, divided highways and the like are significant. More water is able to reach a stream or lake more quickly. Existing stream channels will likely not be able to effectively handle the added stormwater. Water flows over channel banks. Small rain showers, which often never reached the streams as overland flow, now result in bank full floods or worse. This has caused significant problems in Minnesota. Since the Mississippi flooded in 1993, communities in the Minneapolis/St. Paul region have experienced three 100-year floods. This is either a very unfortunate statistical aberration, or the imperviousness of the watersheds has indeed altered the frequency and magnitude of flood events. Several million dollars of repairs and remediation have been necessary as a result of the floods.

Community Actions

Adopt community planning policies to:

- Identify surface water resources.
- Identify natural features associated with water resources, such as forested areas, steep slopes, and wetlands.
- Establish policy statements to create natural buffer zones around surface water bodies and wetlands.
- Establish policy statements to preserve and enhance natural features.
- Establish design policies to retain stormwater runoff and encourage inflow and base flow.

Adopt tools to implement a comprehensive plan that will address the unintended impacts of imperviousness:

- Enact overlay zoning districts, which encourage no development or construction activities within all surface water riparian zones.
- Enact cluster options or Planned Unit Development amendments to existing zoning ordinances, which provide methods and priorities to protect sensitive natural features from development in exchange for possible design incentives to private developers.
- Include conservation easements with third-party oversight provisions in subdivision control ordinance requirements to permanently preserve and maintain sensitive natural features.
- Enact landscaping ordinances to require tree planting and landscaping standards for new and renovated parking lots, street rights-of-way, and new subdivisions.

Modified from an article written by Glenn Bowles, AICP, Center for Land Use Education, UW-Stevens Point, www.uwsp.edu/cnr/landcenter, (715) 346-3783.

Sources:

Anacostia Restoration Team, 1991. Watershed restoration handbook, *Department of Environmental Programs, Metropolitan Washington Council of Governments*.

Arnold, Chester L. and C. James Gibbons, 1996. Impervious surface coverages, *Journal of the American Planning Association*, Vol. 62(2), pages 243 to 258.

Bannerman, 2001. Ultra-urban connected impervious cover percentage. Unpublished data from an email communication.

Cappiella and Brown, 2001. Land use and impervious cover in the Chesapeake Bay region, *Urban Lake Management*, pages 835-840.

NEMO, 2001. Addressing imperviousness in plans, site design, and land use regulations, *Nonpoint Education for Municipal Officials*, University of Connecticut, College of Agriculture and Natural Resources. http://www.caur.uconn.edu/ces/nemo.

SEMCOG, 2000. Putting Southeast Michigan's water quality plan into action, tools for local governments. *Southeast Michigan Council of Governments*, Detroit, Michigan.

Steuer, J.J. and R.J. Hunt, 2001. Use of a watershed modeling approach to assess hydrologic effects of urbanization, North Fork Pheasant Branch Basin near Middleton, Wisconsin, *U.S.G.S. Water Resources Investigation Report 01-4113*. Middleton, Wisconsin.

Avoid Shoreland Disaster: What You Need to Know *Before* Using Coconut Fiber Logs

Coconut fiber logs are frequently used in shoreland restoration projects – usually to protect an eroding shoreline (see *From Shore to Shore* Nov-Dec 2003) or to protect newly installed aquatic plants from wave action. They are made of compressed coconut fiber surrounded by a mesh tube. They are usually 10 feet in length and range in diameter from 6-20 inches. Their life expectancy is 3-5 years – herein lies a potential problem…

In 1999, a shoreland restoration project was installed on a Minnesota lake, using coconut fiber logs anchored at the water's edge to protect the planting. Native plant seed and plants were installed in the upland and wet transition portions of the project, and aquatic plants were established offshore in shallow water. One…two…three years passed. Aquatic, wet transition and upland plants all flourished under the owner's care and spread to form a beautiful shoreland buffer. The fiber log held fast in spite of waves, floods and ice action. Some "volunteer" plants started to grow in the fiber log itself. The owners were pleased…until year four. In 2003, the fiber log began to decompose (as expected), the log and plants growing in the log were gradually swept away by wave action, and the soil and well-established plants behind the log were soon to follow. By mid-summer of 2003, only the upland portion of the shoreland planting remained.

While a very unfortunate situation for the shoreland property owner, future users of coconut fiber logs can benefit from the lessons learned at this site:

1) There is a limited window of time (3-5 years) to establish dense vegetation in and around the coconut fiber log. (There was limited vegetation growing in the fiber log and none growing between it and the aquatic vegetation at this site.) The logs should be placed so that they are partially submerged along their entire length during the average summer water level. At this location they can protect the plants behind it from uprooting, protect exposed soil from eroding, and provide favorable moisture conditions within the log to promote plant growth. Dense plantings of wet transition and emergent aquatic plant species directly behind the logs will naturally spread water-ward and grow through the fiber logs in the process. Aquatic plantings directly in front of the logs will further protect the area from wave and ice action.
2) The vegetation established in and around the coconut fiber log must have a very dense and/or stout perennial root system that can withstand ice and wave action, as well as seasonal water fluctuation. (The vegetation that established by itself on the fiber log at this site was primarily fine, shallow rooted flower species – some annual.) Plant selection is crucial in this area of high erosion. Species with underground stem and root systems that are very resistant to erosive forces and adapted to fluctuating water levels include: hard- and soft-stemmed bulrush, three-square, spike rushes, sedges, sweetflag, arrowhead, and burreed. Plantings at the water's edge should be predominantly these species. Further up in the wet transition zone, willow, red-osier dogwood, other flood-tolerant shrubs and flowers can be added. Many of the showy, wet transition flower species do not have root structures that will resist erosion and should be used sparingly at high-energy sites.

To view a very successful shoreland project at a very difficult site (extreme water fluctuation, wave action, and high human use area) visit Lake Phalen. The Ramsey-Washington Metro Watershed District and the City of St. Paul Division of Parks and Recreation have worked together to established a shoreland buffer along the southern portion of the lake that is a wonderful example of effective use of vegetation for both shoreline erosion control and upland beauty. For background information on this project visit: www.rwmwd.org.