LEVEL 1 TERMS & DEFINITIONS

BENEFICIALS

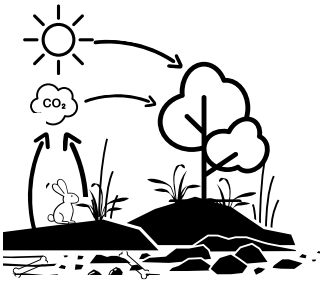
Include insects, nematodes, microorganisms, animals, and plants that support or are vital to the health, growth, and fruitfulness of plants.

BIODIVERSITY

The quality and variety of genes, species, and eco systems in the aggregate, across a larger landscape. Biodiversity is a critical component and key indicator of a healthy and productive ecosystem.

CARBON CYCLE

In the carbon cycle, plants absorb carbon dioxide from the atmosphere and use it, combined with water they get from the soil, to make the substances they need for growth. The process of photosynthesis incorporates the carbon atoms from carbon dioxide into sugars. Animals eat the plants and use the carbon to build their own tissues. Animals return carbon dioxide into the air when they breathe and when they di- since the carbon i returned to the so during decomposition. The carbon atoms in soil may then be used in a new plant or small microorganisms. The same atoms can be recycled for millennia. Best landscape practices tend to increase soil carbon content in living and dead organic matter.



CHEMICAL PESTICIDES

Chemically and industrially manufactured products that kill pests or inhibit the growth of pest populations including plants, insects, fungi, algae, and mammalian species. An umbrella term for insecticides, herbicides, fungicides, mollusk killers, rodent controllers, etc.

CLIMATE CHANGE

A long term change in the meteorological and environmental conditions that alter typical or average weather patterns of a region or city. This could be a change in a region's average annual rainfall or it could be a change in a city's average temperature for a given month or season. Climate change is also a change in Earth's average temperature or typical precipitation patterns. MORE INFO

COMPOST

Organic materials combined under controlled aerobic conditions that create humus from the raw ingredients. Commonly used as a soil additive to increase organic matter and add permeability.

COMPOST FILTER SOCK

A type of contained compost filter berm; a mesh tube filled with composted material that is placed perpendicular to sheet-flow runoff to control erosion and retain sediment in disturbed areas. Compost blankets provide similar stabilizing.

COMPOST TEA

A liquid extract of compost that contains plant growth compounds and beneficial microorganisms.

CULTIVAR

A plant variety that has been produced in cultivation by selective breeding. A cultivar does not convey the same genetic diversity (biodiversity) as the open-pollinated true species because cultivars are genetically identical.

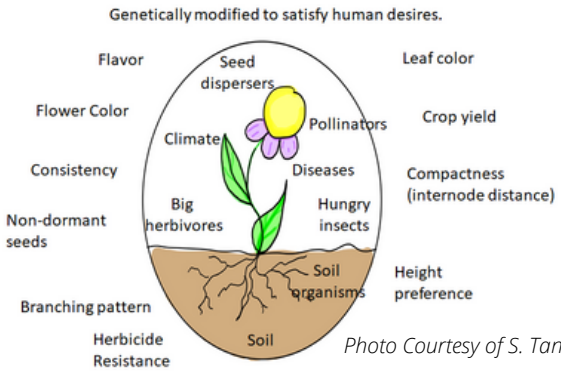


Photo Courtesy of S. Tangren

DESIGN STORM

The design storm is a concept applied to the design of stormwater management practices and systems. It describes a theoretical storm in terms of rainfall depth and duration (e.g., a 10-year, 24-hour storm is a storm with a rainfall amount that, probabilistically, is expected once every 10 years with a storm duration of 24 hours).

Traditionally, the design storm is applied to the design of stormwater conveyance systems (e.g., inlets, pipes, channels, detention ponds). More recently, a simplified concept of the design storms is applied to water quality treatment practices and is usually described as a target rainfall depth, such treating the first one-inch of rainfall.

DRIP IRRIGATION

Irrigation devices that discharge water directly to (or under) the soil surface at a controlled rate through "emitters" that are installed on or molded into flexible tubing (usually polyethylene), or are attached to hard pipe (PVC). Drip irrigation can meet the needs of plants using 50% less water than sprinkler irrigation because it applies water very uniformly, avoids overspray to non-target surfaces (pavement, unplanted areas) and minimizes evaporation from foliage, soil surfaces, and misting. Drip irrigation can also be used for precise applications of fertilizers.

ECOREGION

Areas that reflect broad ecological patterns occurring on the landscape. In general, each ecoregion has a distinctive composition and pattern of plant and animal species distribution. Abiotic factors, such as climate, landform, soil, and hydrology are important in the development of ecosystems, and thus help define ecoregions. Within an individual ecoregion, the ecological relationships between species and their physical environment are essentially similar.

ECOSYSTEM

A community of living organisms in conjunction with the non-living components of their environment (things like air, water & mineral soil) interacting as a system.

EROSION & SEDIMENT CONTROL

Erosion and sediment control practices are designed to reduce erosion and sedimentation at construction sites. Erosion control means preventing erosion from taking place through stabilization of disturbed areas and other measures. Sediment control involves using practices to intercept and filter sediment-laden water so that it does not flow off-site or into waterbodies. In the permitting world, this can also be referred to as construction stormwater, whereas use of permanent BMPs used to control runoff after construction is complete is known as post-construction stormwater.

FERTILIZER

A substance containing one or more of the 16 recognized plant nutrients that are used to promote plant health and growth.

FILTER STRIPS

A strip or area of vegetation for removing sediment, organic matter, and other pollutants from runoff and waste water. MORE INFO

FOREST STEWARDSHIP COUNCIL (FSC) CERTIFIED WOOD PRODUCTS

Wood products certified by the Forestry Stewardship Council (FSC), a group of 12 global certifiers that evaluate both forest management activities (forest certification) and tracking of forest products (chain-of-custody certification).

GABION WALLS

A cage, cylinder or box filled with rocks, concrete, or sometimes sand and soil for use in civil engineering, road building, military applications and landscaping. Uses include retaining structures, like retaining walls, and anti-corrosion structures such as sea walls and river bank defenses. MORE INFO

GREEN STORMWATER INFRASTRUCTURE (GSI)

Using green solutions to help reduce overflows by allowing stormwater to infiltrate slowly into the ground and cutting the volume of stormwater entering the system *(see also Low Impact Development and Runoff Reduction)*.

GENETICALLY MODIFIED ORGANISMS (GMOS)

An organism whose genetic material has been altered through the use of genetic engineering techniques. These techniques, generally known as recombinant DNA technology, use DNA molecules from different sources, which are combined into one molecule to create a new set of genes. This DNA is then transferred into an organism, giving it modified or novel genes.

HABITAT

The natural home or environment within an ecosystem, of an animal, where it can obtain food, water, shelter, and anything else it needs to survive and reproduce.

HEAT ISLAND EFFECT

As urban areas develop, changes occur in their landscape. Buildings, roads, and other infrastructure replace open land and vegetation. Surfaces that were once permeable and moist become impermeable and dry. These changes cause urban regions to become warmer than their rural surroundings, forming an "island" of higher temperatures in the landscape. Mitigation strategies include:

- Increasing tree and vegetative cover
- Installing green roofs (also called "rooftop gardens" or "eco-roofs")
- Installing cool—mainly reflective—roofs
- Using cool pavements

HYDROLOGY

The study of the movement, distribution, and quality of water – the water cycle.

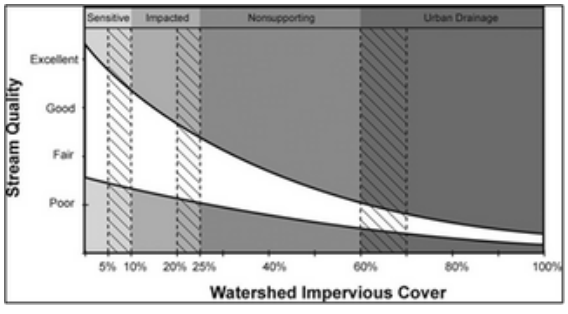
INTEGRATED PEST MANAGEMENT (IPM)

Integrated pest management is an effective and environmentally sensitive approach to pest management that relies on a combination of common-sense practices, including pest monitoring, setting thresholds of acceptable damage, and using cultural and pest control methods with the least non-target impact. IPM programs use current, comprehensive information on the life cycles of pests and their interaction with the environment. This information, in combination with available pest control methods, is used to manage pest damage cost-effectively, with the least possible hazard to people, property, and the environment.

IMPERVIOUS COVER MODEL

Developed by the Center for Watershed Protection, describes the relationship between watershed impervious cover and various measures of stream health/quality *(e.g., water quality, stream biota, etc.)*. As impervious (IC) cover increases in a small watershed, stream health declines. Along a spectrum of increasing IC, the model divides watershed classifications into sensitive ,impacted, non-supporting, and urban drainage.

First presented in the 1990s, the model was updated in 2009 *(see figure)*. The chief update was to show a broader cone at lower levels of IC, because stream quality can also be impacted by loss of wetlands, agricultural drainage, forest clearing, and other activities, even if overall IC is relatively low. The cone is narrower towards the right side of the graph because these watersheds are more developed and it is more difficult to achieve good stream quality – in other words, the relationship between IC and stream quality is well defined at higher levels of IC.



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LOW IMPACT DEVELOPMENT (LID)

LID is an approach to land development (or re-development) that works with nature to manage stormwater as close to its source as possible. LID employs principles such as preserving and recreating natural landscape features, minimizing effective imperviousness to create functional and appealing site drainage that treat stormwater as a resource rather than a waste product.

There are many practices that have been used to adhere to these principles such as bioretention facilities, rain gardens, vegetated rooftops, rain barrels, and permeable pavements. By implementing LID principles and practices, water can be managed in a way thatreduces the impact of built areas and promotes the natural movement of water within an ecosystem or watershed. Applied on a broad scale, LID can maintain or restore a watershed's hydrologic and ecological functions. LID has been characterized as a sustainable stormwater practice. *See also definition of Runoff Reduction.*

LIVING SHORELINE

Shorelines are often stabilized with hardened structures, such as bulkheads, revetment, and concrete seawalls. These structures often increase the rate of coastal erosion, remove the ability of the shoreline to carry out natural processes, and provide little habitat for estuarine species. NOAA is working to implement a more natural bank stabilization technique called "living shorelines." This approach uses plants, sand, and limited use of rock to provide shoreline protection and maintain valuable habitat.

Living shoreline projects utilize a variety of structural and organic materials, such as wetland plants, submerged aquatic vegetation, oyster reefs, coir fiber logs, sand fill, and stone. The benefits of living shorelines include:

- Stabilization of the shoreline.
- Protection of surrounding riparian and intertidal environment.
- Improvement of water quality *(via filtration of upland run-off)*
- Creation of habitat.

MORE INFO

LANDSCAPE MANAGEMENT PLAN

A written plan outlining the utilitarian, ecological, and aesthetic objectives for a specific landscape. The plan describes the specific practices and products that will be used to implement the landscape management plan, along with a schedule of annual maintenance practices.

MYCORRHIZA

The symbiotic association of the mycelium of a fungus with the roots of a seed plant.

MULCH

A layer of material applied to the surface of an area of soil to conserve moisture, improve the fertility and health of the soil, reduce weed growth, and/or enhance the visual appeal of the area. A mulch is usually, but not exclusively, organic in nature. It may be permanent (e.g. bark chips) or temporary (e.g. plastic sheeting). It may be applied to bare soil, or around existing plants. Mulches of manure or compost will be incorporated naturally into the soil by the activity of worms and other organisms. The process is used both in commercial crop production and in gardening, and when applied correctly can dramatically improve soil productivity.

MULCH MOWING

Mowing with equipment that disperses cut grass clippings over the mowed area during the mowing process where the clipping decompose and return to the soil naturally.

NONPOINT SOURCE POLLUTION (NPS)

Results from land runoff, precipitation, atmospheric deposition, drainage, seepage or hydrologic modification. NPS comes from many diffuse sources. It is caused by rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands, coastal waters and ground waters. MORE INFO

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NUTRIENTS

Stormwater runoff may contain nutrients such as nitrogen and phosphorus from fertilizers, pet waste, leaves, and grass clippings. Excessive amounts of nutrients cause harmful algal growth and other ecosystem imbalances. Nitrogen and phosphorus are regulated in the Chesapeake Bay TMDL.

NOXIOUS WEED LIST

Maryland Invasive Plant List
Pennsylvania Invasive Plant List
Virginia Invasive Plant List

MATERIAL SAFETY DATA SHEET (MSDS)

An MSDS contains information on safe working procedures when handling chemical products, provides hazard evaluations on the use, storage, handling, and emergency procedures for specific materials within a product formulation and the potential health and environmental impacts of exposure to chemicals or other dangerous substances in that formulation. An MSDS is prepared by the manufacturers of chemical products, and is required to be made available to workers who handle these substances. MSDS information is available from the manufacturer and also through online resources.

NATIVE PLANT

A plant that occurs within a natural range, and in particular habitats where over the course of evolutionary time it has adapted to physical conditions, and co-evolved with other species.

NATURALLY-DERIVED FERTILIZERS

Plant nutrients derived from naturally occurring plant, animal, microbial, or mineral sources.

NATURAL LAWN CARE

Soil and turf installation and maintenance practices that create healthy, deep-rooted turf that resists damage from pests, weeds, traffic and drought, with minimal chemical and water inputs and waste outputs. Key practices include appropriate site and species selection, soil preparation with compost, mulch-mowing at proper heights, moderate fertilization with organic sources based on plant needs, watering deeply but less frequently, integrated pest and weed management, and renovation practices including aeration, compost topdressing, and over-seeding to restore dense turf.

POINT SOURCE POLLUTION

Any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged. This term does not include agricultural storm water discharges and returns flows from irrigated agriculture. MORE INFO

SEDIMENT

The matter that settles to the bottom of a liquid. Material deposited by water, wind or glaciers. Sediment is regulated as a stormwater pollutant in the Chesapeake Bay TMDL (Total Maximum Daily Load.)

SITE ASSESSMENT

The process of identifying the presence or likely presence of any hazardous materials on a property, where conditions indicate a release or threatened release of hazardous materials into structures on the property or into soils, groundwater or surface water on the property. MORE INFO

SOIL FOOD WEB

An incredible diversity of organisms make up the soil food web. They range in size from the tiniest one-celled bacteria, algae, fungi, and protozoa, to the more complex nematodes and micro-arthropods, to the visible earthworms, insects, small vertebrates, and plants. As these organisms eat, grow, and move through the soil, they make it possible to have clean water, clean air, healthy plants, and moderated water flow. MORE INFO

PEAK DISCHARGE

When it starts to rain, the discharge (rate of water running off) from a site increases as the storm continues. At some point, the rate of discharge reaches a "peak," which is the maximum rate for that particular storm. After the peak, the rate declines as the rainfall diminishes. The peak, or maximum flow, for that storm is called the peak discharge. The figure below is from Basic Principles of Watershed Restoration and Stormwater Management in the Chesapeake Bay Region, one of the key references for CBLP. The top of each curve is the peak discharge, with the figure illustrating a key concept of stormwater management: after development, the peak discharge increases and occurs earlier in the storm cycle. This becomes one primary objectives of stormwater management – putting practices in place to reduce the post-development peak discharge so it can better replicate the pre-developed condition (see definition of Pre-development Hydrology).

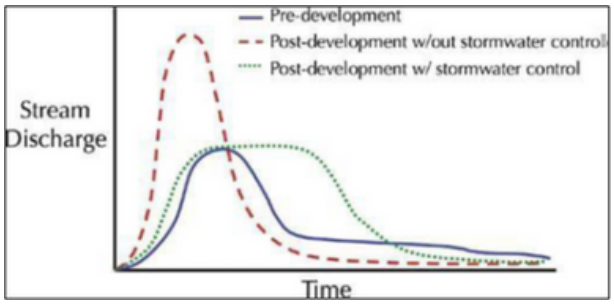

Figure 5. A typical urban hydrograph. Source: Adapted from Thompson, T.M. Low Impact Development Presentation;
Biological Systems Engineering, Virginia Polytechnic Institute and State University: Blacksburg, VA, USA, 2009.

ORGANIC MATTER

Matter composed of organic compounds that have come from the remains of once-living organisms such as plants and animals and their waste products in the environment.

ONSITE INFILTRATION

Stormwater retention and treatment encouraged for Low Impact Development (LID). Includes compost-amended soils, trees, rain gardens and bioretention areas, vegetated swales, pocket wetlands and stormwater wetlands, vegetated landscaping, and vegetated buffers.

PEST

The term "plant pest" has a very specific definition in terms of the International Plant Protection Convention and phytosanitary measures worldwide. A pest is any species, strain, or biotype of plant, animal, or pathogenic agent injurious to plants or plant products

PRE-DEVELOPMENT HYDROLOGY

A term often used in the context of land development where runoff will change due to changes in land cover, such as adding more impervious cover or managed turf to a site. In this context, pre-development hydrology refers to a site's existing (before development) characteristics with regard to volume, flow rates, and duration of runoff, as well as other factors such as groundwater recharge. Matching some of the post-development hydrologic conditions to the pre-development levels is often an objective of stormwater regulations, and "replicating" pre-development hydrology is a long-standing objective of low-impact development (LID) design.

PLANT COMMUNITIES

Groups of plants that tend to occur together in particular local environments. The Level 1 study guide includes a table of common plant community types that occur in Maryland, Pennsylvania, and Virginia.

PLANT HEALTH CARE (PHC)

An emphasis of plant health over pest management. PHC takes an ecosystem approach that emphasizes working with nature instead of fighting nature, and it sees proper culture as the foundation of a healthy landscape. PHC has evolved from IPM: It still incorporates all IPM principles, but goes beyond it.

POLLINATORS

Animals such as birds, bees, bats, butterflies, moths, and beetles that move pollen within flowers or carry pollen from flower to flower. Plants may also be pollinated by abiotic factors such as wind and water.

RAIN SHUT-OFF SENSORS

Sensors that prevent an automatic irrigation controller from starting valves when a set amount of rainfall occurs. Rain sensors can be used with any irrigation controller that runs solenoid valves.

RUNOFF REDUCTION

Runoff reduction has become a design objective as well as a standard in more recent state and local stormwater regulations that dictate stormwater design for new development and redevelopment projects.

In BMP design, runoff reduction is accomplished through a set of processes that include infiltration, canopy interception, evaporation, transpiration, rainwater capture (e.g., cisterns), and extended filtration (using an underdrain below soil media). To the extent that BMP can incorporate these processes, the more runoff is reduced as water flows through the BMP.

While runoff reduction defines a set of processes, it is related to other terms that also describe a design approach: low-impact development, environmental site design, green stormwater infrastructure, better site design, etc. While these terms can be confusing and the strategies may vary in their fine details, all have an objective of better replication of "natural" hydrology and reducing runoff volumes.

SMART IRRIGATION CONTROLLERS

Irrigation timers that automatically adjust watering schedules based on calculations using current weather data from on-site sensors or sent from regional weather stations, and/or historic data. Demonstrated to maintain healthy landscapes with 20% less water than standard controllers. They must be accurately set using information about plants, soil, exposure and irrigation rates in each zone.

SOIL MANAGEMENT PLAN

Site plan (drawing) showing both:

1. Vegetation and soil protection zones (to be fenced and protected from disturbance during construction
   Areas that will be disturbed during construction and then restored (*typically by decompacting and amending soil with compost or bringing in compost-amended topsoil)*

Soil management plans should also include a worksheet showing how much compost, topsoil, and/or mulch will be used in each soil restoration area. They should be communicated to all construction personnel to ensure that protection zones are maintained during construction and that all disturbed areas are restored at the end of construction. MORE INFO

SOIL MOISTURE SHUT-OFF SENSORS

Sensors that prevent an automatic irrigation controller from starting valves when soil is moist. Many soil sensors require the addition of a proprietary control module between the sensor and a controller.

SOIL PHYSICAL PROPERTIES

Soil is composed of differing proportions of minerals, organic matter, water, and air. The physical properties of soil include texture (*relative proportions of sand, silt, and clay)*, structure, density, pore spaces, consistency, color, and other properties. The physical properties of soil are important in determining its water holding capacity, runoff characteristics, permeability, and other factors that influence use for stormwater or vegetated systems and susceptibility to compaction and disturbance.

SOIL INTERFACES

Layers of the soil profile that are composed of very different soil texture and density that interfere with movement of water, nutrients, and roots.

SOIL WATER HOLDING CAPACITY

The specific ability of a particular type of soil to store water, after it is allowed to fully drain. Clay soil stores more than three times as much water per foot of depth than sandy soil; silty and loamy soils store an intermediate amount. However much of the water stored in clay is held too tightly for plants to access, so they must be watered just as frequently—in small amounts. Loamy soils are able to store the most Plant Available Water.

STORMWATER RETENTION & DETENTION

These terms refer to stormwater storage and treatment functions of certain stormwater best management practices (BMPs). Stormwater retention is the process utilized by BMPs such as wet ponds and stormwater wetlands where the practice retains a certain pool of water (known as a permanent pool). In a stormwater detention practice, the runoff is collected during a storm event, but the practice holds it only temporarily. The water is released at a controlled rate with the design intent of the practice becoming "dry" in order for the storage to be available for the next storm.

SYNTHETIC FERTILIZERS

Plant nutrients manufactured by chemical and industrial processes. These include products not found in nature or products synthetically compounded or simulated from natural sources.

VOLATILE ORGANIC COMPOUND (VOC)

Organic chemicals that have a high vapor pressure at ordinary room temperature. VOCs include both human-made and naturally occurring chemical compounds. Most scents or odors are of VOCs. Some VOCs are dangerous to human health or cause harm to the environment. Anthropogenic VOCs are regulated by law, especially indoors, where concentrations are the highest. Harmful VOCs typically are not acutely toxic, but have compounding long-term health effects.

WATER BUDGET

A calculation of the irrigation use expected for a site based on the square footage of landscaping, plant types, and measured efficiency of the irrigation system (or an efficiency goal). Water Budgets based on efficient irrigation assumptions can be compared to the existing water use on a site to gauge the efficiency of irrigation equipment and management. They are also used by municipalities to establish limits on planting of high water use plants at new developments, and by some water purveyors to establish maximum allowable water use for a property.

WATER QUANTITY & QUALITY

In the stormwater context, water quantity refers to management of runoff volumes and peak flows (see definition of Peak Discharge). For low-impact development and green infrastructure, water quantity usually refers to the volume of water generated by the land covers of a site and techniques to reduce this volume (see definition of Runoff Reduction and Runoff Volume).

Water quality refers to the pollutants contained in that runoff. In the Chesapeake Bay Watershed, the target water quality parameters include total suspended sediment (TSS), total phosphorus (TP), and total nitrogen (TN). However, other water quality constituents are also important, and include microbes, hydrocarbons, heavy metals, and other contaminants.