

**Student Handout #1:
LAND USE AND POLLUTANTS: CAUSES AND EFFECTS**



LAND USE	Yard care/ Landscape chemicals	Automobile fluids	Animal waste	Paint, cleaners, & detergents	Trash	Sediment	Pool chemicals	Toxic runoff/ petrochemicals	Heavy metals	Industry & power plant discharge	PAHs*	Golf course runoff	Thermal pollution
Houses	?	?	?	?	?	?	?	?	?		?		
Mobile Homes	?	?	?	?	?	?	?	?	?		?		
Apartments	?	?	?	?	?	?	?	?	?				
Commercial	?	?		?	?	?		?	?		?		
Office	?	?			?	?		?	?				
Industry			?		?	?		?	?	?	?		?
Civic	?	?	?	?	?	?	?	?	?		?		
Open Space		?	?		?		?					?	
Transportation/ Utilities	?	?			?			?	?	?	?		?
Undeveloped/ Rural	?		?			?							

*PAHs (Polycyclic aromatic hydrocarbons) are a group of over 100 different chemicals that are formed during incomplete burning of coal, oil and gas, or other organic substances found in coal tar, crude oil, and roofing tar.

How land uses are categorized

LAND USE	Type of Building or Service	
Commercial buildings	Retail stores, Grocery and food sales, Auto related, Entertainment, Personal services, Lodgings, Building services	
Office	Administrative offices, Banks, Medical offices, Research and Development	
Industry	Manufacturing, Warehouses, Equipment sales and service, Recycling and scrap, Animal handling	
Civic	Schools, Hospitals, Government services, Meeting and assembly facilities (churches), Cemeteries, Day cares	
Open Space	Parks, Recreational facilities, Golf courses, Preserves and protected areas, Water drainage areas and detention ponds	
Transportation/Utilities	Roads, Highways, Bridges, Railroads, Transportation terminal, Aviation, Parking facilities, Utility services, Radio towers, Communication service facilities, Water/Wastewater	
Undeveloped/Rural	Rural uses, Vacant land, Land under construction	
Types of Pollutants	Pollution sources	What are the Effects?
Yard care/	<ul style="list-style-type: none"> Fertilizers, weed killer, insecticide, fungicides, and grass, tree and shrub clippings wash 	<ul style="list-style-type: none"> Phosphorus and nitrogen from fertilizers cause algal blooms, which depletes water of oxygen,

Landscape pollutants	to stormdrains or soak into groundwater when it rains	<p>killing fish and aquatic life</p> <ul style="list-style-type: none"> • Pesticides and herbicides can be harmful to humans and aquatic organisms (some are carcinogenic or attack the nervous system) • Loose grass clippings and leaves clog drainage systems and/or cause algal blooms in water
Automobile pollutants	<ul style="list-style-type: none"> • Oil, antifreeze, brake fluid, grease and metals on streets and driveways run off pavement to stormdrains or soak into groundwater • Nitrogen and other contaminants emitted from automobiles settle in water • Oil, grease, transmission fluids, etc. spilled from automobiles, trucks, buses, planes, etc. wash to stormdrain or creek 	<ul style="list-style-type: none"> • Oil, petroleum products and other toxins from automobiles kill fish, plants, aquatic life and even people (contaminate drinking water). Used oil from a single oil change can ruin a million gallons of water-a year's supply for 50 people. • Some of these toxins and metals are absorbed in various aquatic life and can cause medical problems to humans when contaminated fish and shellfish are consumed. • Pollutants such as heavy metals and automobile fluids are toxic to aquatic life (interferes with photosynthesis, respiration, growth and reproduction).
Organic waste- once part of a living animal (feces or food)	<ul style="list-style-type: none"> • Failing sewer systems spilling out raw sewage after a heavy rain • Leaking or failing septic systems • Pet wastes not collected and disposed of appropriately • Pathogens from rotting food or dead animals • Discharge from food-processing plants, meat-packing houses, dairies and other industrial sources • Organic waste from fibers originating from textile and plant processing plants • Wastewater treatment plants 	<ul style="list-style-type: none"> • Fecal coliform bacteria in pet droppings and septic tank overflows can cause infections and diseases by getting into drinking water and recreation areas • Pathogens from food and dead animals may also cause infections and diseases if they enter water sources • Phosphorus and nitrogen from organic material cause algal blooms, which depletes water of oxygen, killing fish and aquatic life
Household chemicals	<ul style="list-style-type: none"> • Improperly disposed paint, solvents and other chemicals runoff or soak into the ground • Household and commercial cleaning agents wash into water and stormdrains • Washing car 	<ul style="list-style-type: none"> • Paint, cleaning supplies and other toxic materials contaminate drinking water and kill fish, animals and plants • Detergents cause explosive plant and algae growth, which depletes water of oxygen, killing fish and animals as well as creating a terrible smell
Trash	<ul style="list-style-type: none"> • Litter washed into stormdrains, creeks, and groundwater 	<ul style="list-style-type: none"> • Looks and smells unpleasant; can harm wildlife
Sediment	<ul style="list-style-type: none"> • Soil and sediment absorb toxins and transport them to creek beds and groundwater • Construction of new buildings, homes and streets causes excessive erosion • Paved roads cannot absorb chemicals, soil and suspended particles in runoff 	<ul style="list-style-type: none"> • Sediment settles to the bottom of a creek or lake and prevents sunlight from reaching plants, clogs fish gills, chokes other organisms and can smother fish spawning and nursery areas
Pool chemicals	<ul style="list-style-type: none"> • Swimming pool water illegally discharged to a creek 	<ul style="list-style-type: none"> • Chlorine kills aquatic life
Toxic runoff/ petrochemicals	<ul style="list-style-type: none"> • Grease and other toxins from restaurants, vehicles, machinery, cleaning products, garbage and toxic waste not disposed of properly • Fuel and oil spilled on the pavement washes to storm drains and/or bodies of water • Chemical spills or medical waste improperly managed 	<ul style="list-style-type: none"> • Oil, petroleum products and other toxins from automobiles kill fish, plants, aquatic life and even people. One quart of oil will contaminate thousands of gallons of water because it doesn't dissolve • These toxins as well as trace metals and degreasing agents used on automobiles contaminate drinking water and can cause major illness • Some of these toxins and metals absorbed in various aquatic life cause medical problems in people when contaminated fish and shellfish are eaten.
Types of Pollutants	Pollution sources	What are the Effects?
Heavy metals	<ul style="list-style-type: none"> • Car and truck exhaust, worn tires and engine parts, brake linings, weathered paint, and 	<ul style="list-style-type: none"> • Toxic to aquatic life and can potentially contaminate groundwater

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Industry and power plant discharge	<ul style="list-style-type: none"> Litter washed into stormdrains and creeks Chemicals 	<ul style="list-style-type: none"> Looks and smells unpleasant; harms wildlife Toxins and metals absorbed in various aquatic life cause medical problems in humans when they consume contaminated fish and shellfish.
Runoff from golf courses	<ul style="list-style-type: none"> Fertilizer and pesticide runoff from golf courses, sidewalks, playgrounds, and landscaped areas entering a body of water as runoff 	<ul style="list-style-type: none"> Phosphorus and nitrogen from fertilizers cause algal blooms, which depletes water of oxygen, killing fish and aquatic life Pesticides and herbicides can be harmful to human and aquatic life
PAHs (Polycyclic aromatic hydrocarbons)	<ul style="list-style-type: none"> PAHs enter water through discharges and decomposed asphalt 	<ul style="list-style-type: none"> PAHs are carcinogenic-surprisingly low concentrations (parts -per-trillion range) can cause adverse effects in both fish and zooplankton
Thermal pollution	<ul style="list-style-type: none"> Discharge of heated water from power plants Removal of shade trees along creek banks 	<ul style="list-style-type: none"> Inhibits fish growth and reproduction and can be fatal to aquatic life Increases evaporation thus decreasing flow rate of river