# Storm Drain Survey

**Grades:** 9 - 12

**Time Allotments:**

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|---|---|
| Teacher preparation: | 45 - 60 minutes |
| Anticipatory set: | 15 - 20 minutes |
| Lesson/activity: | 45 - 60 minutes (twice) |
| Closure/assessment: | 30 - 45 minutes |

**Content Objectives: After performing this activity students will be able to:**

1) Describe what stormwater and storm drains are and explain reasons for having a stormwater management system;
2) Describe what nonpoint source pollution (NPS) is and identify causes and impacts of specific NPS examples; and
3) Suggest strategies for reducing or preventing specific examples of NPS.

**Process Objectives: Students will:**

1) Observe, measure and document data at assigned locations pre-and post certain weather conditions;
2) Compare, contrast and analyze findings from both trips, from the various sites; and
3) Work in small groups to accomplish tasks.

**Curricular Areas and Corresponding Core Curriculum Content Standards:**

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|---|---|
| Consumer/Family/Life Skills | **9.2** (G12) A1, C2, F4 & 5 |
| Social Studies: | **6.6** (G12) B2, C2, D1, E1, 3 & 6 |
| | **6.1** (G12) A6 |
| Science: | **5.10** (G12) A1 |
| | **5.1** (G12) A2 & 3, B1, C1 |
| Mathematics: | **4.5** (all grades) A1 |
| Language Arts Literacy: | **3.4** (G12) A1 & 3, B1 |
| | **3.3** (G12) A2 |

**Vocabulary:**

- Impervious Surface
- Nonpoint Source Pollution
- Pervious Surface
- Runoff
- Storm Drain
- Stormwater

**Materials Needed:**

- Clipboards – one per group of students
- Pencils – one per group of students
- Tape measures or yard sticks – one per group of students

- Copies of "Storm Drain Survey" worksheet – one copy (per drain) per group
- Flashlights – one per group of students
- Plastic or rubber gloves – one pair per group of students
- Blank paper

**Notes to Teacher:**

- Walk or drive on school property and in surrounding neighborhoods and make note of all storm drains that can be used for this activity. Also note any unsafe or high-risk areas (i.e., high-traffic areas) to avoid when taking students outdoors. Some school properties or neighborhoods may not have an adequate number of drains for this activity.
- The two walks in this activity are weather dependent and local weather predictions should be monitored closely. The first walk should be taken one or two days prior to a predicted rain storm and the second walk should be taken immediately after the rain stops or within a day or two following the storm.
- If the class is small they can work in small groups and stay together as one class when visiting the drains. If the class is large you should coordinate having extra adult chaperones (one adult per group of students) and assign groups of students to monitor one or more different drains for this activity.
- Review the background information on stormwater and NPS that is referenced and linked to as part of this Web site.

**Anticipatory Set:**

- Show students the storm drain drawing and ask them the following questions:
  - What is this? Have you seen these near your home or in your neighborhood? Where are these usually found?
  - How many of you have lost items down one of these drains? What do you think happens to the things that fall into it?
  - What do you think the drain's purpose is? When are these most useful?
- Discuss the definitions of "pervious" and "impervious" surfaces. Ask them to identify surfaces found outdoors that are pervious (grass, sand, fields, soil, gravel, etc.) as well as those that are impervious (concrete, asphalt, rock, roads, roofs, etc.).
- Discuss with students the definitions of stormwater, storm drain and runoff and review the reasons for having a stormwater management system.
- Finally, work with them to compile a list of examples of NPS and write these down on the chalkboard to be used later.

**Guided and Independent Practice:**

- Explain to the class that they will be taking two walks outdoors to examine storm drains that either are on school property or are in the nearby community.
- Explain that the purpose of the first walk will be to examine the types of surfaces and land use around and near these drains and to identify the types of materials and chemicals, or NPS, that may enter the drains. The purpose of the second walk will be to examine what occurs in and around the drains after a rainstorm.

- For the first walk, each group of students should receive a clipboard, pencil, one worksheet for each storm drain they visit, a flashlight and a tape measure or yardstick. Make sure each group has detailed directions for their respective drains.
- Before groups depart, review the categories on the worksheet with them and explain what they will need to do for each category while at each drain.
  - Category #1: Have them describe how the land around the sewer is being used and what surfaces are next to, as well as near, the drain. Also have them note any slopes that lead to the drain. (Example: the drain is next to an asphalt road and part of a concrete curb; behind and around the drain is packed soil with sprouts of grass and weeds surrounding it. The dirt slopes slightly down to the drain.)
  - Category #2: Have them describe all man-made or natural materials that are visible within about 10 feet of the drain (have them use the tape measure or yard stick to determine this distance). For each item have them measure the distance between it and the drain and write this down as well. (Examples: one stick 2 feet long is 14 inches from drain on the dirt/grass; one paper coffee cup 3 feet from drain along curb; one cigarette butt on top of drain along edge; and one puddle of motor oil is 5 ½ feet from drain on asphalt road.)
  - Category #3: Have them re-examine how the land is being used around the drain and identify possible contributors of NPS. (Examples: passing or parked cars may leak motor oil onto the pavement, passing pets may deposit animal waste, and fertilizer may be spread on nearby lawns.)
  - Category #4: Have them shine the flashlight into the drain, identify any visible forms of NPS in the drain and write down the location of each. (Examples: a pile of wet leaves and sticks on left border of drain (facing drain), a smashed white paper bag in upper left corner, two sticks in the center of drain, and one baseball in right corner.)
  - Safety Issues: Tell students to avoid touching any items or materials. If it's necessary to do so, have one student wear the gloves to touch or move any materials. Anything sharp or questionable should be avoided. Students should avoid lingering in areas where there is car or pedestrian traffic. Only one person should go into the street to measure while the others watch for traffic.
- When back in the classroom, have students finish writing down their observations then collect their materials and save everything for the second trip.
- Form the same groups and divide up the equipment for the second trip, which should follow a recent storm. Give each group a blank worksheet for each drain they are to visit and review any safety procedures. Make sure that each group returns to visit the same drains that they observed during the first trip. They should follow the same steps as the first trip and make their observations.

**Closure:**

- Provide each group with their data sheets from the first trip. Give them time to work together to compare, contrast, analyze and discuss any differences encountered at each drain and what their conclusions are. Have them record their conclusions on paper and share them with the class.
- Discuss the following questions with the students:
  - How do various forms of NPS end up in or near the storm drains?

- What happened to the items and materials noted on the first trip that have since been moved or are missing?
- What do you think happens to those items and materials that entered the drain?
- Where do you think the stormwater goes?
- How do these materials and items affect the quality of water?
- How do they affect the things that depend on or use the water?

- Ask students to work individually or in their groups to suggest strategies that would help reduce or prevent NPS in the locations they visited.

**Assessment:**

- Records from first and second visits to their drains;
- Written analysis of, and conclusions regarding, their trip records;
- Participation in small group activity and discussion; and
- Responses to questions from the teacher.

**Extensions:**

- Have students create a mural-like map of the school property and/or local community that includes streets, buildings, homes, and other notable structures. Have them identify the locations of each of the drains they visited. For each drain, have them create signs depicting the land use and NPS concerns, along with their strategies for reducing or preventing NPS.
- Invite a representative from the local municipal utilities authority or the municipality to discuss with students the stormwater management system in your area. Encourage the speaker to use maps to describe the flow and channeling of local stormwater.

**Source:**

- ***Beneath the Shell…A Teacher's Guide to Nonpoint Source Pollution and Its Potential Impact on New Jersey Shellfish***. New Jersey Department of Environmental Protection. First Printing 1991; Revised 1993; Reprinted annually from 1997 – 2002 and 2004; adapted from "Storm Drain Survey"(pgs. 49 - 51).

# "Storm Drain Survey" Worksheet

Storm Drain #:_____

Date_____

Trip #1 or #2

Team Members: _____

Location: _____

_____

_____

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|---|---|
| Land Use Around Drain/Surfaces and Slopes | |
| Visible NPS Outside of Drain | |
| Other Possible NPS Contributions | |
| Visible NPS Inside of Drain | |