**LESSON GOALS**
The primary goal of the SYIP is to have students outside, investigating a problem that the students themselves generate. The students will take the topic of water and the idea of comparisons to develop a study. Once the students have identified the problem that they would like to try to learn more about, they will construct a fair test, using the scientific method. This is a secondary goal of the SYIP. Students will devise, develop, deploy and debrief a fair test to gain knowledge about their investigation topic.

The study is useful as a tool that students use to gain experience in creating conducting, analyzing and finding a conclusion in an experiment. This will help students learn to think in a scientific manner, learn more about the out-of-doors, and meet requirements in the science process skills of observation, comparing, measuring, predicting, inferring, hypothesizing, controlling variables and developing a fair test.

Anytime students make a choice in what they are studying, they will work harder, have more interest and generally be better focused. This in turn will create a fun, interesting atmosphere. The topic of water is generally interesting to the students. Then, when the creek and invertebrates are added, interest will go sky high!

Students will practice observation, comparing, measuring, predicting, inferring, hypothesizing skills Students will learn to work together as a group Students will practice descriptive writing skills Students will practice presentation skills Students will devise, develop and deploy an experiment to test a student generated hypothesis

**MATERIALS**
- pH test kits
- dissolved oxygen test kits
- thermometers
- stop watches (student supplied?)
- pingpong ball
- meter sticks
- nets
- containers for invertebrates
- key for identifying pollution sensitive/non-sensitive invertebrates
- fish tank with "creek water" set-up (no heater, native animals, and plants)
• fish tank with "swamp" set-up (no heater, water and land areas with land and water plants and animals)
• sink
• school pond
• creek

PROCEDURE
Sampling sites: The "swamp tank," "creek tank" and the faucet. These are all located in the classroom with easy access for students. Another testing site will be the school pond, located in the school courtyard. There are two parts to the pond, along with a waterfall that could add yet another "site" to study. The last possible study site would be the creek that is just off school property, but is on county property (Kittredge Park). Access to this site would have to be done as a whole class, for students could not be at the creek unsupervised. There are many different parts to the creek. Different sites include sandy, shallow areas, others are deep and clay lined, while others are very rocky and fast moving. Generally, the vegetation is uniform throughout, with trees over head and vegetation growing along the banks.

Methodology:
1. The teacher will divide students into groups of 4. These groups will consist of 2 boys and 2 girls.
2. Once in the groups, the teacher and students will discuss the different water sources that are in and around the school.
3. After all the water sources have been pinpointed, the teacher will direct the students to work in their group and discuss ways that the water sources could be compared.

POSSIBLE STUDENT-DRIVEN QUESTIONS
• What is the difference in pH between two of the water sources?
• What is the difference in dissolved oxygen levels in two of the water sources?
• What is the relationship of water velocity and dissolved oxygen?
• What land of invertebrates will you find in fast moving water in comparison to slow moving water?
• Where will we be able to find colder temperatures, in the pond or in the creek?
• Which water source, swamp tank or pond, will have the lowest/highest dissolved oxygen?

Methodology cont’d:
4. Once the groups have had a chance to discuss ideas, the teacher will lead the class through discussions of their ideas on what they want to do.
5. Groups will then need to write a summary of their idea, describing how they will develop a fair test. This description will be in the form of a letter that students will write to the teacher.
6. After approval by the teacher, the ideas will be published for the class to view.

If it is feasible for each group to complete their own study, please let that happen. If it is not feasible for each group to complete it's own study, then students will present their question to the class in a persuasive manner. Students will then choose which comparison they would like to complete (no voting for their own study). Once this has been completed the teacher will help students organize the investigation and be a guide them through the completion of the investigation.

After the completion of the investigation, the teacher and the students will discuss its outcome, all of its problems and successes, and what could have to been done differently.

Students will then write questions that have been generated by this study that might be the beginning of the next investigation.

RESOURCES
- G.L.O.B.E. water protocol
- Adopt-a-stream information
- Save our Streams information
The Water Resource Book