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How-to-do-it: A Pond Project for Junior High School Students

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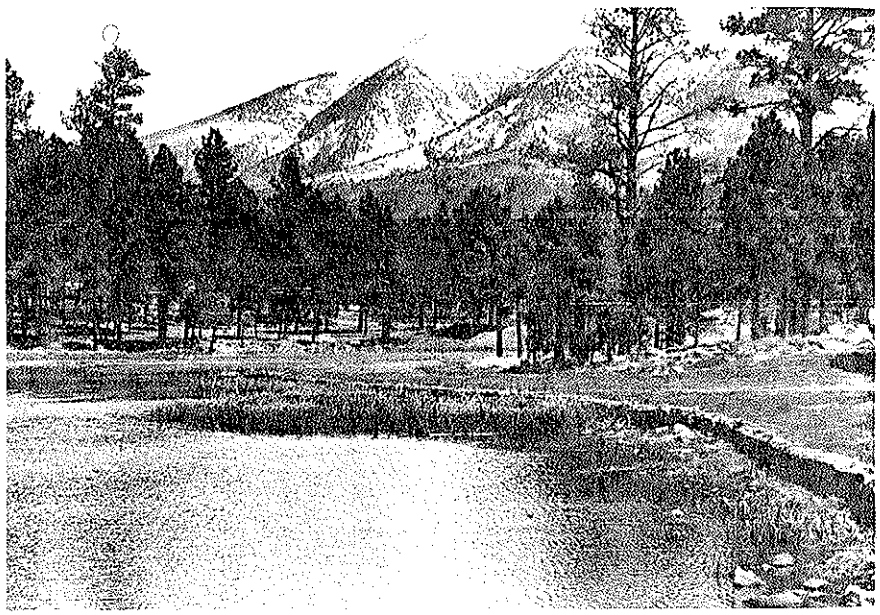

FIGURE 1. Flagstaff Junior High's pond study is located below the 13,000 feet high San Francisco Peaks. Snows from the mountains flow into the pond, which has been transformed from a mudflat to an attractive multiple-use area.

Copies of an old Coconino SUN, northern Arizona's century-old newspaper, described a drowning in an area called the City Pond.

The year was 1923. Yellow journalism still had its influence on the small community of Flagstaff. The paper told of the discovery of the lifeless body of a 13-year-old and of the town's folk gathering around the dismal scene.

Editions of the same paper would in later years report citizens' requests that something be done with the City Pond, which had by now deteriorated into a mudflat full of garbage and debris.

Something has been done and in 1976 the area provides a conservation classroom for nearby Flagstaff Junior High School students and a focal point for a combined community effort.

From Mudflat to Useful Area

In early 1923, city fathers began construction of a small dam to catch waters flowing from the San Francisco Peaks, north of Flagstaff, down a sometimes swollen river, mostly dry stream bed. Recreation was the primary purpose of the Rio de Flag dam and pond. Public use consisted of fishing, swimming, and ice skating (Flagstaff, although in sunny Arizona, is located at 7,000 feet and frequently experiences winter snow).

Slowly, an evolution was to take place in city thinking. Once a recreation center, the pond began to take on a "mudflat" appearance. Water in the flood control structure was no longer retained but released through a pipe outlet. Many in the community dumped their trash at the site.

Once each year the pond project became a campground for Flagstaff's All-Indian Pow Wow resulting in many hours of clean up and extensively damaged vegetation.

After Flagstaff Public Schools completed a new open classroom junior high next to the pond, school staffers almost immediately realized a potential outdoor classroom was right in their own backyard.

The city on the other hand still considered the pond as it had for years—a control device for infrequent flooding. Some called the area a potential drowning or other accident waiting to happen. We would later find the controversy teaching students as much about city government and local politics as biology.

The single purpose management of the area didn't give us much of an environment to study. Wildlife use of the pond was slight at best and only when water was available. Students had to be transported miles

way to study and observe aquatic life.

A gradual conversion was about to take place. During the spring of 1975, teachers and students were joined by the U.S. Soil Conservation Service, one of the many agencies which would help shape the pond project, in gathering ideas and planning use of the area. The plan included a permanent body of water, construction of an island, wildlife food and cover plantings, and restoration of the surrounding park. Next stop was the city council.

We presented the plan with maps and drawings illustrating a project to establish natural plant communities and to provide students with an opportunity to observe both terrestrial and aquatic life. Students sat in the council chambers during the proceedings and viewed the governmental process firsthand.

Some on the council were skeptical. Members of the city staff were concerned about downstream flooding, traffic patterns, and access for fire and emergency vehicles. The proposed opening of a street above the pond posed a real threat of channeling traffic into the study area.

After much deliberation, the project was approved and a massive cleanup campaign began.

Many hours of work by students, parents and interested people in the community transformed the pond in less than a year into a meaningful study area. Biology was the primary purpose for many of us who envisioned the project. When in the spring of 1976, we listed completed and future projects at the pond we were surprised. Related sciences including geology and archaeology would be provided in natural spin-off. The arts would also make use of the area. Staff members in many disciplines were involved in planning.

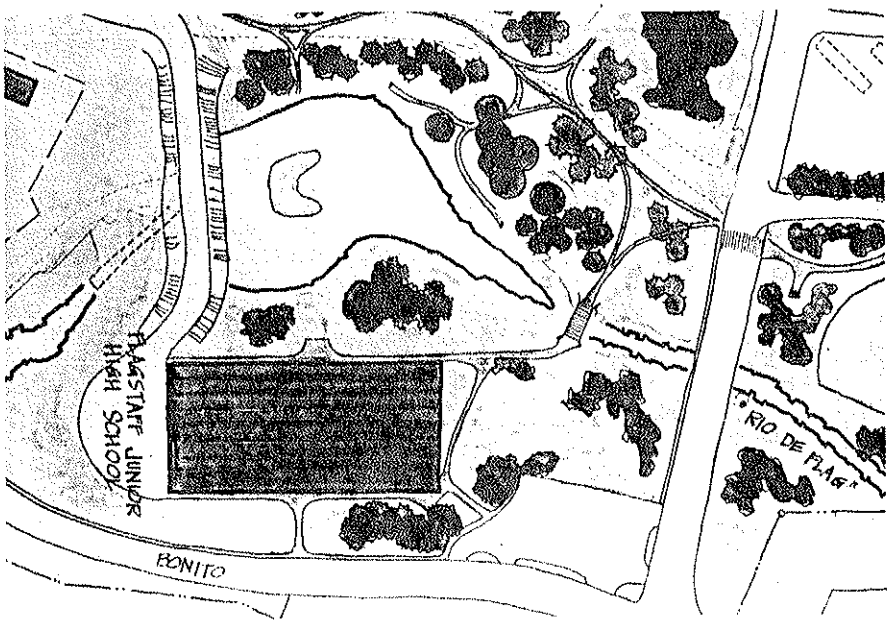

FIGURE 2. The pond is situated next to the junior high school. Before the project began, students were transported miles to study aquatic life.

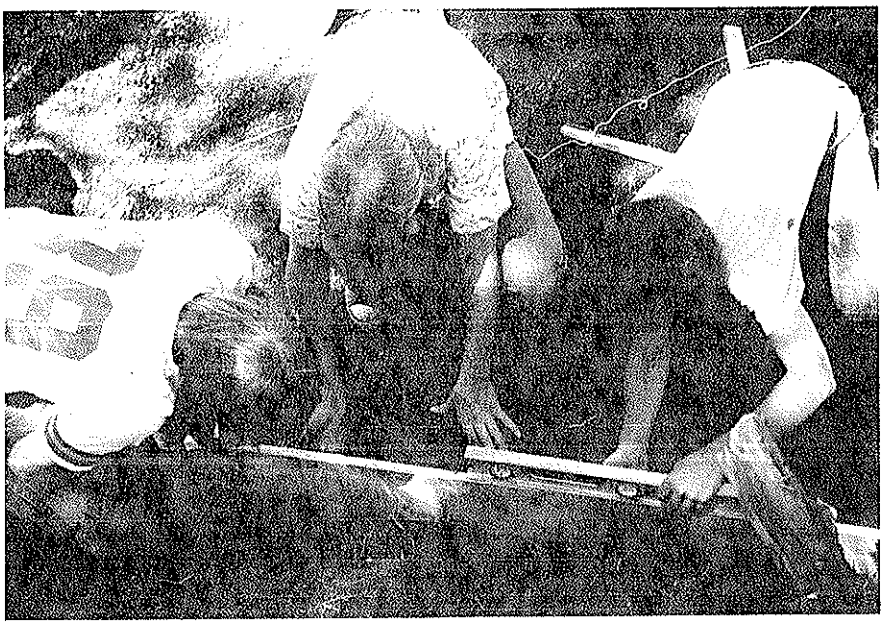

FIGURE 3. Students aided teachers and various community, state, and federal resource groups in completing many pond projects. This young trio is constructing a concrete slab for an outdoor cooker.

Pond Takes Shape

Project number one included draining the existing shallow pond, enlarging the pond proper, and creating an island. Landscaping, including plantings from locally adapted species, would complete this first step in our project. Our goal was to create a wetland environment and habitat for wildlife.

U.S. Soil Conservation Service, Forest Service, city and Arizona Fish and Game personnel aided the project.

Plantings, currently numbering over 3,000, have been an important part of the pond plan to date. With help from the SCS, students identified planting ecosystems.

First, soils needed restoration. Damage to the area over the years was extensive. Volcanic cinders had

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Students (foreground) study specimens and tabulate data, while others (background) collect organisms at the sampling sites.

fied (at least down to order for the insects). The results of 2 teams working at a site are combined to give data from 1 square meter. The numbers and weights of each type of organism as well as the temperature and turbidity at each sampling site are recorded in chart form and saved for comparison with future data.

Results

The classification of the organisms can be quite tedious, but the results are frequently fascinating to high school students. Certain aquatic species are often good indicators of polluted or non-polluted waters. For example, the stonefly larvae require fairly high dissolved oxygen concentrations in order to survive and are a good indicator of reasonably non-polluted water. Certain species of diptera, on the other hand, might be indicators of polluted water if found in high numbers.

In our Billings studies, conducted on the Yellowstone River, we identified stoneflies as an indicator of non-polluted water. In a 1971 study, students found an average of 44 stoneflies per square meter with a total biomass of 2.13 g at the uppersite. Two stoneflies per square meter with a total weight of .12 g were found at the lower site. A possible interpretation of this data might be that the city's industries (oil refineries, sugar refinery, packing plant, steam generator), a notorious drainage ditch or seeping septic tanks had polluted the river between the two check points.

By 1975, however, the count at the upstream check point had dropped to 15 stoneflies per square meter with a biomass of 1.90 g, while the data at the downstream site showed an increase to 12 stoneflies with a weight of 1.45 g per square meter surveyed. One explanation for the change in data since 1971 could be that the source or sources of the stream contamination had ceased to pollute—some pollution abatement equipment had been installed, drainage ditches had been cleaned, and several residences formerly on septic tanks had been connected to the city sewer system.

Of course, other explanations for the data can also be offered—student error, natural fluctuations in the river, increased pollution from sources above the upstream check point and others. No matter what data students find, the exercise is a good one not only as a field study—laboratory activity, but also as a reminder to students of the concerns for which the first Earth Day was established.

Junior High Pond

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been hauled into several sections adjacent to the body of water. City and county officials agreed to provide manpower and machinery to move soils to the pond.

Future Plans

Reseeding is scheduled for denuded areas. Portions of critical areas will remain untreated to demonstrate the long range effect of erosion. Erosion control, wildlife habitat improvement and beautification are educational objectives for this phase of our program.

Rock piles, brush piles, nest boxes, nesting islands, spawning beds, bat roosts and pine snags are all features which are under construction to improve wildlife habitat. An observation blind is in the works to aid students in studying wildlife from a concealed position.

Two amphitheaters, one small, the other a permanent pit-type design, will extend use of the area.

An outdoor cooker will provide students an opportunity to learn cooking techniques. Trail systems, a rockhouse storage building, a wooden bridge, a weather station and a geology exhibit are slated for completion soon.

One unique project will move a Sinagua Indian archaeological site near the pond. Technical assistance will be provided by the Museum of Northern Arizona.

The danger in talking about the pond project is we tend to describe a mammoth project with seemingly hundreds of people and numerous resources involved.

Any facet of the study area is easily adaptable to projects you may create in your community. We've proven it can be done on a large scale at the junior high level. And most important, our experience shows that students are the real winners in an outdoor study conservation area, be it large or small.