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Gary Downs
Iowa State University

Paul Joslin
Drake University

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THE DES MOINES RIVER STUDY

Gary Downs
Iowa State University
Ames, Iowa 50010

Paul Joslin
Drake University
Des Moines, Iowa 50310

Introduction

The Des Moines River Study was a cooperative project involving the Department of Public Instruction, the Drake University Science Education Department, and science teachers and selected students in eighteen schools along the Des Moines River from Estherville to Knoxville. The year-long study began in November, 1974 and ended in October, 1975.

Purpose

It was the purpose of this study, as it was in a previous study on the Little Sioux River, to get students out of the classrooms and into the environment where they can deal directly with reality, and learn that science problems and questions are always close at hand. Because of the nature of modern research in nucleonics, cytology, organic chemistry, and related fields, students tend to believe that all science investigations require sophisticated equipment and elegant techniques. Students in small rural high schools tend to believe that it is possible to acquire a satisfactory science education only in the well-equipped laboratories of a large urban high school. In reality, many of the scientific problems of the most agriculturally productive areas in the world, involve soil erosion, water pollution, animal and plant diseases, and the challenge to increase total food production.

Methods and Materials

The study was started by sending invitations to the superintendents and science teachers in twenty-six school districts along the river north of Des Moines. Twenty schools sent representatives to a planning meeting held at Fort Dodge on September 27, 1974. Eighteen schools and teachers chose to participate (Table 1). Chemical kits previously used in the Little Sioux River Study were supplied to schools that needed them. The original kits had been purchased using a grant from the Drake University Research Council. Replacement chemicals were purchased with a grant from the Department of Public Instruction.

Table 1.

PARTICIPATING SCHOOLS AND TEACHERS

Keith Bahrenfuss Webster City High School Webster City, Iowa 50595	Brian Ellsworth Central Webster Jr.-Sr. High School Burnside, Iowa 50521	Dennis Johnson Fort Dodge High School Fort Dodge, Iowa 50501
Lyle Baker Ft. Dodge Community Schools 330 - 1st Avenue North Ft. Dodge, Iowa 50501	Jack Gerlovich Knoxville High School Knoxville, Iowa 50138	Richard Keith Callanan Junior High School 3010 Center Street Des Moines, Iowa 50312
Larry Braby Pocahontas High School Pocahontas, Iowa 50574	Claison Groff Grand Community High School Boxholm Iowa 50040	Tom Ludwig Hoover High School 4800 Aurora Avenue Des Moines, Iowa 50310
Gary Brown Estherville High School Estherville, Iowa 51334	Merle D. Harris Boone High School Boone, Iowa 50036	Roger Spratt Ames High School Ames, Iowa 50010
Guy Carter Humboldt High School Humboldt, Iowa 50548	Carleton Haugen Stratford Community School Stratford, Iowa 50249	Vern Uchtyl Valley High School 1140 - 35th Street West Des Moines, Iowa 50265
Jack Daniels Emmetsburg High School Emmetsburg, Iowa 50536	Darlene Hudek Gilmore City-Bradgate Junior-Senior High School Gilmore City, Iowa 50541	Gary Walker West Bend High School West Bend, Iowa 50597
Jim Elkin Ogden High School Ogden, Iowa 50212	Noelle Hunt 7200 Aurora Avenue Urbandale High School Urbandale, Iowa 50322	Sister Fran Wohn B.V.M. St. Edmond High School Fort Dodge, Iowa 50501

During the second week of each month a team from each school visited a preselected site on the river and recorded twenty physical and chemical observations. Chemical parameters were sampled using Hach Model AL-36B water test kits.* A few schools use the more comprehensive model DR-EL water test laboratory. Physical parameters were measured using techniques and equipment developed in an earlier study on the Little Sioux River in northwest Iowa. For example, stream speed is measured by floating an orange between two sighting posts. An orange has a density just slightly less than water and after being allowed to accelerate, floats at stream speed. It is easily seen, and if not retrieved, is easily replaced.

*The A1-36B is designed for use on field trips. It is available from the Hach Chemical Company, Ames, Iowa 50010. The kit contains tests for acidity, alkalinity, carbon dioxide, dissolved oxygen, hardness and pH.

FORM A

DES MOINES RIVER STUDY SITE REPORT

SCHOOL _____ DATE _____

OBSERVERS _____

SITE LOCATION : County _____ Township _____ T- _____ R- _____
 Section _____ Quarter _____
 Other Identification _____
 Compass direction of stream flow _____

BOTTOM SEDIMENTS :
 Percent : Rocks _____ Gravel _____ Sand _____ Muck _____ Clay _____
 Thickness : Rocks _____ Gravel _____ Sand _____ Muck _____ Clay _____

STREAM GRADIENT : _____ ft/mile or _____ m/km

STREAM AND VALLEY PROFILE : Valley width _____ m Valley depth _____ m
 Flood plain width _____ m Channel width _____ m
 Valley wall gradient _____ ft/mile _____ m/km

GENERAL SKETCHES :
 a. Using graph paper attach a sketch of the valley profile drawn to scale.
 b. Make a sketch of the stream bed pattern, one mile above and one mile below study area. (See instruction.)

Figure 1.

FORM B

DES MOINES RIVER STUDY SITE REPORT

SCHOOL _____ OBSERVERS _____

SITE NUMBER _____ NAME OF SITE _____

COMPUTER DATA

County number _____
 District number _____
 District name _____
 Observation date _____

PHYSICAL CHARACTERISTICS:

1. Temperature of water in degrees Celsius _____ °C (nearest tenth)
 2. Turbidity in centimeters by Secchi Disc _____ cm (nearest tenth)
 3. Speed in meter per second _____ m/s (nearest hundredth)
 4. Stream width in meters _____ m (nearest tenth)
 5. Stream depth in meters _____ m (nearest hundredth)
 6. Total suspended solids by filter method _____ mg/l (nearest hundredth)
 7. Ice cover in centimeters (average) _____ cm (nearest tenth)
 8. Date of precipitation period _____
 9. Amount of precipitate _____ cm (nearest hundredth)

CHEMICAL CHARACTERISTICS:

1. pH _____ pH (nearest tenth)
 2. Carbon dioxide _____ mg/l (nearest tenth)
 3. Dissolved oxygen (high range) _____ mg/l (nearest tenth)
 4. Alkalinity (high range) _____ mg/l (nearest tenth)
 5. Total hardness* _____ mg/l (nearest tenth)
 6. Calcium hardness* _____ ppm (nearest tenth)
 7. Magnesium hardness* _____ ppm (nearest tenth)
 8. Chloride _____ mg/l (nearest tenth)
 9. Nitrate _____ mg/l (nearest tenth)
 10. Phosphate _____ mg/l (nearest tenth)

* 1ppg = 17.2 mg/l or ppm

Figure 2.

Reports on standardized forms(Figs. 1 and 2)were sent to the office of the State Science Consultant in the Department of Public Instruction in Des Moines. The reports were coded and placed in computer storage. Summarized printouts of the data from all sites were sent each month to the research teams in all schools.

At the end of the project tabulated data for the entire year were made available to the student research teams in all schools. Students analyzed the data in preparation of reports to be given at sessions of the Iowa Junior Academy of Science and for the identification of problems for further research.

Conclusion

It is our belief that you teach science best when you use local resources. What better resources are there for teaching biology than the farm, forest, prairie, and Iowa's streams and lakes? What better way to teach basic chemistry than by first-hand studies of the natural cycles of water, nitrogen, carbon-oxygen, of the air, soil and water?

Beyond this basic education in science there are also elements of personal and social responsibility taught by this project. Students are encouraged to make photographic records of the seasonal changes in the river at their sites and to use these as the basis for educative presentations to local governmental agencies and community-service organizations.

We subscribe to the definition of science suggested by the National Science Teachers Association: "Science is that activity through which best explanations are sought for the observed facts of nature." The Des Moines River Study Project put that definition into practice.

* * *

Hawkeye Science Fair

The Hawkeye Science Fair will be held April 2-3, 1976 in the Veterans Auditorium in Des Moines. For further information contact Dean C. Stroud, Drake University, Des Moines, Iowa 50311.

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Eastern Iowa Science Fair

The Eastern Iowa Science Fair will be held March 27 and 28, 1976. For further information contact: Ms. Sandy Stephen, Director Eastern Iowa Science and Engineering Fair, P.O. Box 1032, Cedar Rapids, Iowa 52406.