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The Des Moines River Study

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THE DES MOINES RIVER STUDY

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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

Lyle Baker
Ft. Dodge Community Schools
330 - 1st Avenue North
Ft. Dodge, Iowa 50501

Larry Braby
Pocahontas High School
Pocahontas, Iowa 50574

Gary Brown
Estherville High School
Estherville, Iowa 51334

Guy Carter
Humboldt High School
Humboldt, Iowa 50548

Jack Daniels
Emmetsburg High School
Emmetsburg, Iowa 50536

Jim Elkin
Ogden High School
Ogden, Iowa 50212

Brian Ellsworth
Central Webster Jr.-Sr.
High School
Burnside, Iowa 50521

Jack Gerlovich
Knoxville High School
Knoxville, Iowa 50138

Claison Groff
Grand Community High School
Boxholm Iowa 50040

Merle D. Harris
Boone High School
Boone, Iowa 50036

Carleton Haugen
Stratford Community School
Stratford, Iowa 50249

Darlene Hudek
Gilmore City-Bradgate
Junior-Senior High School
Gilmore City, Iowa 50541

Noelle Hunt
7200 Aurora Avenue
Urbandale High School
Urbandale, Iowa 50322

Dennis Johnson
Fort Dodge High School
Fort Dodge, Iowa 50501

Richard Keith
Callanan Junior High School
3010 Center Street
Des Moines, Iowa 50312

Tom Ludwig
Hoover High School
4800 Aurora Avenue
Des Moines, Iowa 50310

Roger Spratt
Ames High School
Ames, Iowa 50010

Vern Uchytil
Valley High School
1140 – 35th Street
West Des Moines, Iowa
50265

Gary Walker
West Bend High School
West Bend, Iowa 50597

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)

* lgpg = 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.

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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.