



MAJOR RIVERS TEXAS WATER EDUCATION PROGRAM

Teacher's Guide

Welcome to the revised edition of Major Rivers, a Texas Water Education Program for elementary students.

About Major Rivers

Major Rivers is designed to help fourth- and fifth-grade students learn about Texas' major water resources, how water is treated and delivered to their homes and schools, and how to care for their water resources and use them wisely.

The program's host, Major Rivers (named for the major rivers of Texas), and his horse Aquifer cover these topics in eight lessons that include a variety of activities in science, math, language arts, social studies and other subjects. The teaching package includes student workbooks, pretest and posttest sheets, home information leaflets, overhead transparencies and an introductory video. This Teacher's Guide shows how to use these materials and contains additional learning activities.

Most teachers complete the Major Rivers program over a two-week period, typically as part of their social studies and science curriculums.

The History of Major Rivers

LCRA began developing Major Rivers in 1984 as part of its water conservation activities in the lower Colorado River basin.

In 1987 LCRA hired Educational Development Specialists, a California-based curriculum company, to help develop the program. LCRA also assembled an advisory group of teachers, curriculum directors, water utility officials, and other officials from throughout the lower Colorado River basin to determine subject matter and educational requirements. Field tests of the program in 1988 throughout the lower Colorado River basin played a significant role in shaping the final version of the lessons and of Major Rivers' depiction as a crusty, dusty Texas cowboy.

LCRA also reached an agreement with the Texas Water Development Board, the Texas Department of Health and the Texas Water Commission (now the Texas Commission on Environmental Quality) to distribute a statewide version of the program.

Formally launched in 1989, Major Rivers was an instant success. Students enjoyed the Major Rivers character as they learned about their water resources. Teachers appreciated a multidisciplinary program with a Texas focus that was correlated to state educational requirements. By the end of the 1990s, Major Rivers had reached more than 1 million fourth graders throughout Texas.

The program was revised in 1993 to include some additional activities and update the educational requirements correlation. In 2001 LCRA began work on a second revision, working with a curriculum consultant, LCRA staff and a Teacher Advisory Committee to produce a new edition for teachers in the lower Colorado River basin. Statewide interest in the curriculum grew and in 2003 LCRA, the Texas Water Development Board and many water providers and water management entities throughout the state began work on a new statewide version. This version is now available through the Texas Water Development Board.

What's New in Major Rivers

The new edition of Major Rivers has the look and feel of the old program, while containing these additions and improvements:

- Correlation with Texas Essential Knowledge and Skills (TEKS) and Texas Assessment of Knowledge and Skills (TAKS) standards.
- More “hands-on” learning opportunities for students, in keeping with TEKS.
- Additional activities that expand such topics as water quality and water planning and provide additional interdisciplinary activities in math, language arts, history and other subject areas.
- Links to Internet resources, and information on how to incorporate these resources into your students’ learning experiences.
- A new visual look that is cleaner and more appealing to a diverse audience while retaining the spirit and appeal of the original Major Rivers.

We hope you enjoy using this new, improved Major Rivers.

Acknowledgments

LCRA would like to thank these people for their hard work:

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TABLE OF CONTENTS

TEACHING MAJOR RIVERS		i
ADDITIONAL RESOURCES		vii
TEKS AND TAKS OBJECTIVES		viii
LESSON 1	Water in Texas (Pretest and Introduction) (Objective 1)	1
LESSON 2	The Water Cycle (Objective 2)	7
LESSON 3	Texas Water Supply and Planning (Objective 3)	13
LESSON 4	Texas Watersheds and River Basins (Objective 4)	31
LESSON 5	How Our Water Use Affects Our World (Objective 5)	45
LESSON 6	Water Treatment and Distribution (Objective 6)	55
LESSON 7	Using Water Efficiently (Objective 7)	67
LESSON 8	Review and Posttest	79
APPENDIX 1	Originals: Pretest, Posttest, Review Worksheets and Water Puzzles	85
APPENDIX 2	Answer Keys: Review Worksheets and Water Puzzles	97

TEACHING MAJOR RIVERS

Water in Texas is as important to our lives as the air we breathe. Yet our water supply is not always reliable in many parts of the state. Further, as our population continues to grow, greater and greater demands are placed on this limited resource. So it is important that we be aware of water — where it comes from, how our actions impact its quality, how we treat it, how much we use, and how we can use it wisely.

The Major Rivers Water Education Program is intended to help fourth-grade students throughout Texas learn how we get and use water, how important it is for us to conserve water, and how to keep it clean. This program contains teacher and student materials focused on specific instructional objectives.

Objectives

The instruction in the program focuses on seven specific learning objectives.

1. **Water in Texas**

Students will become aware of the importance of water to Texas.

2. **The Water Cycle**

Students will identify the various steps in the water cycle — precipitation, surface runoff, percolation, evaporation and condensation.

3. **Texas Water Supply and Water Planning**

Students will identify basic facts about the water supply in Texas, including regional differences in rainfall, the amount of water supplied by surface water and by groundwater, and the state's major rivers and aquifers. Students will also understand the importance of water planning and identify water management strategies used to ensure adequate water supply.

4. **Watersheds and River Basins**

Students will understand the concepts of river basins and watersheds and be able to identify their river basin and local watershed. Students will create changes in a simulated streambed to evaluate the effects on water flow rates and directions.

5. **How Our Water Use Affects Our World**

Students will identify various uses of water, including municipal, agricultural, industrial, recreational, and electric generation. Students will differentiate between point-source and nonpoint-source pollution. Students will recognize that most water pollution is caused by human activity within the watershed.

6. **Water Treatment and Distribution**

Students will identify the steps and processes of the water distribution system in Texas — wells and reservoirs, pipelines, water and wastewater treatment plants, septic systems, and recycled water.

7. **Using Water Efficiently**

Students will review which home water activities use the most water, identify water conservation practices, and assess their individual water conservation practices.

8. **Review and Posttest**

Students will exhibit an understanding of the importance of water to Texas.

These objectives not only define important knowledge and skills related to water, but they also support many of the Texas Education Agency's TEKS and TAKS objectives for social studies, science, language arts and math. A chart showing the program correlations to the TEKS and TAKS objectives is on pages viii-xii.

Instructional Planning

Procedures for each lesson are in this teacher's guide. Each lesson can usually be completed in one or two class periods. Some lessons will take more or less time, depending on the pace of instruction and student interest. In most lessons, suggestions are provided for optional extension and enrichment activities that can help expand the outcomes of the program.

Materials

The program contains all the basic teacher and student materials needed to conduct instruction. Additional materials are listed with each lesson. Included with the packet are:

- Teacher's Guide
- Major Rivers Video
- The Water Cycle overhead transparency
- Texas Average Annual Rainfall overhead transparency
- Major River Basins overhead transparency
- Regional Water Planning Groups overhead transparency
- Water Treatment and Distribution overhead transparency
- Program Evaluation Sheet
- Originals of the following:
 - Pretest
 - Posttest
 - Groundwater and Surface Water Student Data Sheet
 - Regional Water Planning Groups Worksheet
 - Major River Basins in Texas Worksheet
 - Streambed Simulation Student Data Sheet
 - Frankie the Fish Data and Observation Sheet
 - Water Treatment Laboratory Worksheet
 - Don't Be Clueless Worksheet
 - Wa-Ter Your Choices? Cards
 - Review Worksheets
 - Water Puzzles
- 30 copies of the following:
 - Student Workbook
 - Home Information Leaflet

SCIENCE

Texas Essential Knowledge and Skills Objectives		Correlating TAKS Objectives		L E S S O N									
				1	2	3	4	5	6	7	8		
(1) Scientific Processes													
(a) demonstrate safe practices during field and laboratory investigations.	TAKS Grade 5 Objective 1: Student will demonstrate an understanding of the nature of science.	■	■	■	■	■	■	■	■	■	■	■	■
(b) make wise choices in the use and conservation of resources.	TAKS Grade 5 Objective 1	■		■	■						■	■	
(2) Scientific Processes													
(a) plan and implement descriptive investigations.	TAKS Grade 5 Objective 1		■							■			
(b) collect information by observing and measuring.	TAKS Grade 5 Objective 1	■	■	■	■	■	■	■	■				
(c) analyze and interpret information to construct reasonable explanations.	TAKS Grade 5 Objective 1	■	■	■	■	■	■	■	■				
(d) communicate valid conclusions.	TAKS Grade 5 Objective 1		■	■	■	■	■	■	■				
(e) construct simple graphs, tables, maps and charts to organize, examine and evaluate information.	TAKS Grade 5 Objective 1		■		■				■	■			
(3) Scientific Processes													
(a) analyze, review, and critique scientific explanations, including hypotheses and theories.	TAKS Grade 5 Objective 1		■					■					
(c) represent the natural world using models and identify their limitations.	TAKS Grade 5 Objective 1		■	■	■	■	■	■					
(4) Scientific Processes													
(a) collect and analyze information using tools.	TAKS Grade 5 Objective 1	■	■	■	■	■	■	■	■	■	■	■	■
(6) Science Concepts													
(a) identify patterns of change such as in weather.	TAKS Grade 5 Objective 2: Student will demonstrate an understanding of the life sciences.		■	■	■								
(7) Science Concepts													
(a) observe and record changes in the states of matter caused by the addition or reduction of heat.	TAKS Grade 5 Objective 3: Student will demonstrate an understanding of the physical sciences.		■										
(b) conduct tests, compare data, and draw conclusions about physical properties of matter including states of matter, conduction, density, and buoyancy.	TAKS Grade 5 Objective 3			■	■								
(10) Science Concepts													
(a) identify and observe effects of events that require time for changes to be noticeable including growth, erosion, dissolving, weathering, and flow.	TAKS Grade 5 Objective 4: Student will demonstrate an understanding of the earth sciences.			■	■								
(b) draw conclusions about "what happened before" using fossils or charts and tables.	TAKS Grade 5 Objective 4			■	■								
(11) Science Concepts													
(a) test properties of soil including texture and capacity to retain water.	TAKS Grade 5 Objective 4		■	■	■					■			
(c) identify the sun as the major source of energy for Earth and understand its role in the growth of plants, in the creation of winds, and the water cycle.	TAKS Grade 5 Objective 4	■	■										■

MATH		L E S S O N							
Texas Essential Knowledge and Skills Objectives	Correlating TAKS Objectives	1	2	3	4	5	6	7	8
(2) Number, Operation and Quantitative Reasoning (a) generate equivalent fractions using concrete and pictorial models.	TAKS Grade 4 Objective 1: Student will demonstrate an understanding of numbers, operations and quantitative reasoning.			■					
(3) Number, Operation and Quantitative Reasoning (a) use addition and subtraction to solve problems involving whole numbers.	TAKS Grade 4 Objective 1			■			■	■	
(4) Number, Operation and Quantitative Reasoning (d) use multiplication to solve problems involving two-digit numbers.	TAKS Grade 4 Objective 1						■	■	
(e) use division to solve problems involving one-digit divisors.	TAKS Grade 4 Objective 1			■			■	■	
(11) Measurement (b) estimate and measure capacity using standard units including milliliters, liters, cups, pints, quarts and gallons.	TAKS Grade 4 Objective 4: Student will demonstrate an understanding of the concepts and uses of measurement.		■	■	■		■	■	
(13) Probability and Statistics (c) interpret bar graphs.	TAKS Grade 4 Objective 5: Student will demonstrate an understanding of probability and statistics.			■			■	■	

READING – LANGUAGE ARTS

Texas Essential Knowledge and Skills Objectives

	L E S S O N							
	1	2	3	4	5	6	7	8
(1) Listening/Speaking/Purposes (a) determine the purposes for listening such as to gain information, to solve problems, or to enjoy and appreciate.	■		■	■	■			
(4) Listening/Speaking/Culture (a) connect his/her own experiences, information, insights and ideas with those of others through speaking and listening.		■	■	■	■	■	■	
(5) Listening/Speaking/Audiences (c) present dramatic interpretations of experiences, stories, poems or plays to communicate.	■						■	
(7) Reading/Fluency (a) read regularly in independent-level materials.	■	■	■	■	■	■	■	■
(b) read regularly in instructional-level materials that are challenging but manageable.			■	■	■	■		
(8) Reading/Variety of Texts (c) read for varied purposes such as to be informed.	■	■	■	■	■	■	■	■
(g) paraphrase and summarize text to recall, inform, and organize ideas.	■		■	■				
(9) Reading/Vocabulary Development (a) develop vocabulary by listening to selections read aloud.			■	■	■	■		
(10) Reading/Comprehension (k) answer different types and levels of questions as well as test-like questions such as multiple choice, true-false and short answer.	■	■	■	■	■	■	■	■
(11) Reading/Literary Response (a) offer observations, make connections, react, speculate, interpret, and raise questions in response to texts.	■		■	■	■	■		
(b) interpret text ideas through such varied means as journal writing, discussion, enactment, media.		■	■	■				
(13) Reading/Inquiry/Research (b) use text organizers, including headings, graphic features, and table of contents to locate and organize information.			■	■				
(c) use multiple sources, including electronic texts, experts and print resources, to locate information relevant to research questions.			■	■	■			
(d) interpret and use graphic sources of information such as maps, graphs, timelines, tables and diagrams.	■	■	■	■	■	■	■	■
(f) produce research project and reports in effective formats using visuals to support meaning, as appropriate.	■		■	■				
(g) draw conclusions from information gathered from multiple sources.			■	■				
(23) Viewing/Representing/Interpretation (b) interpret important events and ideas gathered from maps, charts, graphics, video segments or technology presentation.	■	■	■	■	■	■	■	■

SOCIAL STUDIES		L E S S O N							
Texas Essential Knowledge and Skills Objectives		1	2	3	4	5	6	7	8
(1) History									
	(a) identify Native American groups in Texas and the Western Hemisphere before European exploration and describe the regions in which they lived.				■				
	(b) compare the ways of life of Native American groups in Texas and the Western Hemisphere before the European exploration.			■	■				
(2) History									
	(a) summarize reasons for European exploration and settlement of Texas and the Western Hemisphere.				■				
	(c) explain when, where, and why the Spanish established Catholic missions in Texas.				■				
	(d) identify the accomplishments of significant impresarios including Moses Austin, Stephen F. Austin, and Martin de Leon and explain their impact on the settlement of Texas.				■				
(3) History									
	(e) identify leaders important to the founding of Texas as a republic and state.			■	■				
(4) History									
	(c) identify the impact of railroads on life in Texas, including changes to cities and major industries.				■				
	(d) describe the effects of political, economic and social changes on Native Americans in Texas.				■				
(5) History									
	(a) identify the impact of various issues and events on life in Texas such as urbanization.	■		■	■	■	■	■	■
(6) Geography									
	(a) apply geographic tools, including grid systems and legends to construct and interpret maps.			■	■				
	(b) translate geographic data into a variety of formats such as raw data to graphs and maps.			■	■				
(7) Geography									
	(a) describe a variety of regions in Texas that result from patterns of human activity.			■	■	■			
	(b) describe a variety of regions in Texas that result from physical characteristics.			■	■	■			
(8) Geography									
	(a) identify clusters of settlement in Texas and explain their distribution.			■	■				
	(b) explain patterns of settlement at different time periods in Texas.			■	■				
	(c) describe the location of cities in Texas and explain their distribution.	■		■	■				■
	(d) explain the geographic factors that influence patterns of settlement and the distribution of population in Texas, past and present.			■	■				
(9) Geography									
	(a) describe ways people have adapted to and modified their environment in Texas.			■	■	■	■	■	
	(b) identify reasons why people have adapted to and modified their environment in Texas.			■	■	■	■		
	(c) analyze the consequences of human modifications of the environment in Texas, past and present.			■	■	■	■		
(11) Economics									
	(b) identify the economic motivations for Anglo American colonization in Texas.			■	■				
(13) Economics									
	(a) explain how people in different regions of Texas earn their living.			■	■	■			
	(b) explain how geographic factors have influenced the location of economic activities in Texas.			■	■				
	(c) analyze the effects of immigration, migration, and limited resources on the economic development and growth of Texas.			■	■				
	(e) explain how developments in transportation and communication have influenced economic activities in Texas.				■				
(17) Citizenship									
	(a) explain the meaning of selected patriotic symbols and landmarks of Texas, including the six flags over Texas, San Jose Mission and the San Jacinto Monument.				■				
(21) Science, Technology and Society									
	(b) describe how scientific discoveries and technological innovations have benefited individuals, businesses and society in Texas.			■					

Continued on next page

SOCIAL STUDIES (continued)**Texas Essential Knowledge and Skills Objectives**

	L E S S O N							
	1	2	3	4	5	6	7	8
(22) Social Studies Skills								
(a) differentiate between, locate and use primary and secondary sources.			■	■				
(b) analyze information by sequencing, categorizing, identifying cause-and-effect relationships, comparing and contrasting.			■	■	■	■	■	
(c) organize and interpret information in outlines, reports, databases and visuals, including graphs, charts, timelines and maps.			■	■		■	■	
(d) identify different points of view about an issue or topic.			■					
(f) use appropriate mathematical skills to interpret social studies information such as maps and graphs.			■	■			■	
(23) Social Studies Skills								
(a) use social studies terminology correctly.			■	■				
(b) incorporate main and supporting ideas in verbal and written communication.			■	■				
(c) express ideas orally based on research and experiences.			■	■				
(d) create written and visual materials such as journal entries, reports, graphic organizers, outlines and bibliographies.			■	■				
(e) use standard grammar, spelling, sentence structure and punctuation.			■	■				
(24) Social Studies Skills								
(a) use a problem-solving process to identify a problem, gather information, list and consider options.			■	■	■		■	
(b) use a decision-making process to identify a situation that requires a decision, gather information, identify options, predict consequences and take action to implement a decision.			■	■				