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Introduction

National standards in geography and the Texas Essential Knowledge and Skills (TEKS) call for the application of geography's content and method to the solution of real world problems -- matters such as traffic congestion, environmental decision making, business location decisions, understanding how history has affected present-day geography, the drawing of political boundaries and the use of maps to analyze and understand the distribution and location of geographic phenomena. This "able to do" geography requires active student participation in the problem solving process and in so doing provides them with life-long skills. They will become "geographers for life" and they will forever look at the world in a more knowledgeable fashion.

The Texas Alliance for Geographic Education has hosted two summer teaching training institutes that have focused on problem solving geography. In 1997, teachers prepared lesson plans on "Community-Based Problem Solving Geography," and in 1998, a different group worked long and hard on "World Geography: Big Issues and Problem Solving." This volume is a selection of lesson plans, all correlated with national standards, the five themes of geography and the TEKS. We hope that these lesson plans give you ideas or perhaps even can be used "as is" by teachers. They reflect a higher level of teaching and learning and should encourage students to be more excited about geography and to recognize the important role that geography plays in our everyday lives.

Richard G. Boehm
TAGE, Co-coordinator

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Problem Solving with Geography

Within today's geography classroom, students should be given the opportunity to examine both their local community and the global community. An excellent way to do this is through problem solving activities. Community-based problem solving allows students to apply their geographic knowledge and skills to solve problems that have an immediate impact on their community, just as global issues problem solving allows students to explore issues that affect the world as a whole.

Problem solving is the analysis of issues through a geographical perspective. This type of problem solving allows students to see geography within their own community and throughout the world. By utilizing this classroom technique, students will not only develop their problem solving skills, but can actually make a difference in their communities. This strategy teaches students how to identify a problem, analyze causes, and implement solutions. As a result, students will become empowered by the knowledge that their actions can and do affect their communities. Community-based problems can vary from the location of a stop sign to how hurricanes or droughts affect a community. Other examples may include recycling, urban growth , air pollution, or crime. Examples of global issues could include world population growth, sustainable development, uneven distribution of resources and global climate change.

As described in *Geography for Life*, the national standards in geography, geography is the study of spatial aspects of human existence. It has much more to do with asking questions and solving problems than it does with rote memorization of isolated facts By using problem solving activities we are giving students the opportunity to truly experience geography.

Pamella Crawford
Sharon Stuhlreyer

Problem Solving and the Five Skills of Geography

The five skills of geography are asking geographic questions, acquiring geographic information, organizing geographic information, analyzing geographic information, and answering geographic questions. Through the use of problem activities, students have opportunities to utilize and reinforce their geographic skills. Listed below are the five skills of geography and a description of each skill. The five skills of geography are processes that must be practiced during a problem solving activity. The five skills of geography can and should be used as a framework for geographic problem solving activities. (For further information on the five skills of geography, please consult *Geography for Life*, chapter three.)

Asking Geographic Questions

Asking geographic questions allows students to identify geographic problems. "Where" and "why there" are the two most important geographic questions. The use of this skill allows students to become familiar with their surroundings, and it also gives students the opportunity to see the difference between geographic and non-geographic questions. As students study their surroundings or other regions of the world, they should begin to identify geographical issues.

Acquiring Geographic Information

Acquiring geographic information is the process of gathering information on a geographic issue. Human and physical characteristics are some of the types of information students will be looking for. This information will come from a variety of sources such as maps, charts, surveys, and interviews. It is important to remind students to get both primary and secondary sources. Primary sources are sources of information derived from fieldwork activities such as surveys, interviews, and taking photographs. These types of sources allow students to create their own perception and ideas on an issue before they see the results of other sources of information. Secondary sources include maps, newspapers, the internet, and government publications.

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Organizing Geographic Information

Organizing geographic information is the process of arranging the newly acquired information into a clear and concise visual representation. Different types of this representation could be student produced maps, charts, and graphs. It is very important that the information is organized in a clear and concise manner, as it will be used for the following skill.

Analyzing Geographic Information

Analyzing geographic information is the process of interpreting the gathered information, whether it be maps, diagrams, or charts. Through this process students analyze their gathered material and determine what information is relevant to their topic. This activity also allows the student to "identify similarities and associations, recognize patterns, and draw inferences." (*Geography for Life*)

Answering Geographic Questions

This final geographic skill, answering geographic questions, is the culmination of the above processes. It is imperative that skills one through four are completed before reaching this skill. Basically, this is what you have been striving for throughout the problem solving activity. This is the time when the asking of questions, the acquiring, organizing, and analyzing of geographic information, is complete and students are able to come to a conclusion and find a solution for their geographic problem.

What you have just read is a brief description of the five skills of geography. If further explanation of the skills is necessary please consult *Geography for Life.*

Pamella Crawford
Sharon Stuhlreyer

GREAT GRAINS OF AMERICA

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DESCRIPTION:

This unit is designed to introduce students to the history and migration of grain crops between Europe and the New World and the continued movement of these grain crops across the United States of today.

GRADE LEVEL:

Upper primary - Fifth and Sixth

PURPOSE:

The student will gain an understanding of agricultural regions, specifically of the grains grown in the United States. The student will learn where they are grown, how they are transported for processing, where the raw grains are made into consumer products and distributed.

ESSENTIAL ELEMENTS:

6A describe and compare the location of places to other places within the United States and between the United States and the world;

6B analyze exploration, migration, and settlement patterns in the development of the United States;

6C apply geographic tools to interpret data presented in various forms (maps, globes, charts, graphics);

6D compare and contrast regions of the United States in terms of physical and cultural characteristics and describe their connections;

6E explain how people have adapted to and modified their environment:

FUNDAMENTAL THEMES:

Location, Place, Human Environment Interaction, Movement, and Regions.

CONNECTION TO NATIONAL GEOGRAPHY STANDARDS:

1. Knows and understands how to use maps, globes and other graphical tools to acquire, process and report information.

2. Uses mental maps to give spatial perspective to the world.

3. Knows how to analyze spatial organization.

4. Knows and understands the physical and human characteristics of places.

14. Knows and understands how the earth's physical and human systems are connected and interact.

16. Knows and understands the changes in meaning, distribution, and importance of resources.

17. Knows and understands how to apply geography to interpret the past.

18. Knows and understands how to apply geography to interpret the present and the future.

OBJECTIVES:

When students finish this lesson they will be able to:

1. Identify and list major grain crops of the Unitd States.

2. Create a map showing wheat, corn, rice, and oats within the regions they grow.

3. Collect information from product packages to name grain mills and plot their location on a United States map.

4. Chart the movement of grains and grain products from growing regions to production mills to consumers.

5. Calculate distances (miles, states, regions or countries etc.) between growing regions, mills and consumers.

6. Describe consumer products made from grains.

7. Compare and contrast the movement of grains across the states to the movement of grains between the New World and Europe.

CLASS TIME:

Approximately four days

BACKGROUND:

Indians in Mexico domesticated corn about 7,000 years ago and became adept at creating hybrids or varieties of corn. Corn was the one New World grain adopted by the Europeans and taken back to Spain to be used for fodder for animals as well as food. Because almost any domesticated animal could eat it, corn boosted Europe's supply of meat and dairy products. On the other hand, barley, oats, rye, millet, and wheat were grain crops imported into the New World from Europe, and rice from the Far East.

Today, wheat, oats, rice, and corn are staples of the American's diet and grow abundantly in the United States. These grains are also used to produce the daily intake of breads, cereals, crackers, and pastas eaten daily by Americans. Rice of several varieties is grown in Texas and Arkansas, while the grain growing regions of the United States are located in the Great Plains states, often called "the Breadbasket of America."

PROCEDURES:

1. Use "The Grand Exchange" map to discuss the movement of food sources between the four continents. Identify the grains that were exchanged between Mexico, Europe and the New World.

2. Lead the class through a discussion of the significant importance of food sources to the development of the New World.

3. Through literature, relate the historical and cultural significance of grain crops. (ie. Corn was considered more important than gold to some cultures)

4. Have students bring cereal and cracker product boxes from home. Encourage a variety with little duplication.

5. Use the Atlas to locate the grain growing regions of the United States. Glue grain seeds to corresponding areas on outline maps of the states.

6. From the product boxes, have each student locate the name, city and state of the grain mill that produced the cereal or crackers.

7. Using the detailed map of the United States, each student will locate the city and state of the mill. On their grains regions map, mark this location with an asterik. Students are tracing the movement of their

particular grain product.

8. Each student will locate their home city and state on the map and mark it with an asterik.

9. Using yarn, connect the three locations together, going from the grain growing region to the mill site to the consumer location.

10. Discuss the routes that the students' grain products have traveled, the economic issues, and transportation systems involved in this movement.

11. Compare and contrast the movement of these same grains across the United States to the New World - European movement of grains.

EVALUATION:

Students will be evaluated on group or individual participation during discussions and activities.

The individual map work will provide a tool for comprehension.

Teacher feedback during the activities will provide immediate evaluation.

EXTENSION:

Math - calculate and add average distances.

Writing - letters to mills for nutritional information, product samples and historical facts.

Research - history of grains

Health - compare the nutritional value of grain products.

Celebration of grain products - have the students bring their favorite food made of a grain product and let the class sample.

MATERIALS:

glue
yarn
Atlas (of growing regions)
cereal and cracker boxes brought from home
outline map of the United States for each student
detailed map of the United States to show city and state
grain samples of wheat, corn, rice, and oats

National Geographic map "The Grand Exchange"
literature: Corn is Maize - The Gift of the Indian by Aliki

Optional:

Reference book - The Book of Whole Grains, by Marlene Bumgarner

Grain samples of barley, rye, sorghum (milo), container of sorghum syrup (molasses)

Literature sources:

The Old Woman and The Rice Thief by Bang
Why Corn Is Golden by Viven Blackmore
Corn Husk Crafts by Facklin
Chicken Soup And Rice by Maurice Sendak

LET THE GOOD TIMES ROLL.....

Sharon Benstock, World Geography Teacher, Humble High School 9th Grade Campus, Humble ISD

Description:
This lesson is designed to explore the social problems in the community associated with rapidly increasing population growth and to introduce potential solutions.

Grade level:
High School--can be modified for intermediate

Purpose:
To create an awareness of social problems in the community related to population growth and solutions to those problems.

Texas Essentials Knowledge and Skills (TEKS):
The student:

- A1 understands how to use geographic knowledge, skills, and perspectives to analyze problems and make decisions.
- C11 understands growth, distribution, movement, and characteristics of population.
- E21 understands changing perceptions of places and environments affect people's behavior.
- E22 draws conclusions about cause and effect relationships based on information from a variety geographic sources.
- F25 understands how cultures change and adapt through migration, innovations, and trade.
- G26 understands how to acquire information using a variety of sources.
- G27 understands how to organize and interprets information using a variety of sources.
- G28 communicates in written, oral ,and visual forms.
- G29 works effectively with others in a variety of settings.
- G30 uses a variety of critical-thinking skills.

Connection to National Geography Standards:
The geographically informed person knows and understands:

- 1 how to use maps and other geographic representations, tools, and technologies to acquire, process, and report information from a spatial perspectives.
- 4 the physical and human characteristics of places.
- 6 how culture and experience influence people's perceptions of places and regions.
- 9 characteristics, distribution, and migration of human populations on Earth.

18 how to apply geography to interpret the present and plan for the future.

Fundamental Themes:
Location
Place
Human-Environment Relations
Movement
Regions

Objectives:
When the students finish this lesson/unit, they will be able to:
1. Identify causes of rapid population growth in the community.
2. Identify and describe social issues in the community associated with rapid population growth.
3. Explore and implement solutions to the social problems in the community.

Procedures:

Have the desks broken into groups of 4-6 before students enter the room. You may let them choose the groups or you may place them at a particular group of desks. The students will be seated in this arrangement for the remainder of the unit.

DAY 1

1. **Warm-Up activity:** Have students individually write on a sheet of paper the following questions and answer them: Why do people move? Why are people moving into this area? (10-15 minutes)
   Bring the class together and have the students share their answers. Record them on a transparency, using an overhead, or the board so you can return to them for comparison a few days later.

2. Start discussion with the students on why they think people move from place to place, in general terms; than narrow the discussion to why people might move into "our" community.

3. Based on the discussion have students develop a survey that they can use to interview family, neighbors, and acquaintances, over the age of 21, in the community to ascertain the information. Since this information will be graphed you might lead them toward the following questions:
   1. Sex: Male or Female
   2. When they moved to the area (year)
   3. Why they moved to the area (personal, business, or other) define other.
   4. Do they have kids? How many? Ages?

4. **Homework:**
Have students interview at least 5 different people including: 1 family member, neighbors, and acquaintances using survey developed in previous step. Each student should record, summarize and organize the data they obtained.

DAY 2:

1. **Warm-Up activity:** Have students write on a piece of paper the answer to the following question: Were the results of your interviews what you thought they would be? Explain.

   Have each group compile and organize their data received from surveys. **Handout #1.** Be sure to find the % of why people moved to area instead of just the number.

   $$\frac{\text{Total \# in the category}}{\text{Total \# of people interviewed}}$$ then multiply by 100.

2. After these figures are found tell the students that they, as groups, are going to create a visual based on the compiled data. **Be sure the students have totaled all areas of the data before creating the visual representation.**

3. Get out previously recorded brainstorm activity over the same information and compare reasons for moving into the community or area. At this time ask: How would this affect population growth in community.
   Historical information about the area would be given at this time. (i.e. How and Why area was first developed, How and why has it changed..)

   Aerial photographs and/or maps of the community past and present would be helpful visuals.

   Historical information and maps can be attained from your local Chamber of Commerce.

4. After discussing population growth in the community link it with social issues. Define "social" to the students. Explain that having a growing population is a necessary part of growth however, problems do occur.

   Local newspapers, with current events, would be useful to show social issues and effects.

5. **HOMEWORK:**
   Have students write a 2 paragraph essay (1 paragraph for each section) on: How does the population growth of the area socially affect: 1)the community as a whole and 2) you/your family individually?
   Be sure to cover negative and positive issues/effects. **Handout # 2**

DAY 3:

1. Check the essays for completion. Have students, using their essays, share the social issues/effects they have written. Write one list on the board or overhead and then have the students separate the negative from the positive. Chart the information as follows:

Negative Social Issues/Effects	Positive Social Issues/Effects

2. After the chart and discussion is complete explain to the students that they can choose to be a part of the problem or be a part of the solution. Begin by talking about and or showing the students programs and potential solutions already in the community and ask them: Do they believe the programs to be working? This should lead into the discussion about what could de done to alleviate or help with the solving of the problems in the community.

Materials for the research (i.e. maps for location, brochures about other programs, and phone numbers for community resources) will be provided by the teacher and be in the room. These materials can be found at the local chamber of Commerce and local community resource centers.

3. Hand out guidelines to students and go over step-by-step as a whole class.

Teacher Note: The following scenario should be introduced at this time:

Guidelines are Handout # 3

Scenario:

The community population is really rising and some social issues have started to surface. A local business, Good Time Charlie's, is allocating $500,000 to help the community alleviate some of these problematic issues in the community. Your job is to research and design an original proposal to provide potential solutions. This proposal will be presented to the Board of Directors of Good Time Charlie's in an attempt to convince them that your proposal is the "right" one.

Be sure to address the issue of time management since there are only 2-3 days of working in-class on this project. Some homework and assigning of jobs, within the group, will be necessary by group members.

4. After guidelines have been discussed allow them to work on the proposals for the rest of the class period while monitoring their progress.

DAY 4:

1. Have students work on the proposals. They should have an idea established and should be working on the criteria as noted on the proposal guideline handout.

DAY 5

1. Have students work on proposals. Research and writing should be in full swing with some members of the group working on the other aspects of the presentation.

DAY 6:

1. Have students work on proposal. This will be the last full class period to work on them. They should be:
    a. tieing up any loose ends
    b. completing the visual part of the presentation if not already complete.
    c. practice their presentations

DAY 7:

1. Allow the students 10-15 minutes to get organized and mentally prepared for the presentations.

2. Groups should present proposals to the Board of Directors. After proposals are presented the written portion should be given to the teacher.

Classroom Time:

Classroom time should be about 7 days. However, it can be extended if the students and teacher agree to allow more time for research and writing of the proposal.

Evaluation (Assessment):

Students will be graded individually on the following activities:

1. Completion and compilation of data from neighborhood survey
2. Essay written on population growth in the community and its positive and negative effects
3. Participation in the group

Students will be graded, by a rubric, as a group on:

1. Written portion of the proposal
2. Design of Program (creativity and originality)
3. Presentation of proposal/program

4. Visual Aids of presentation
   A. Map of area and where program will take place.
   B. Population Pyramid: to age group that the program should be geared towards.
5. Visual representation of reasons why people moved into the area.

Teacher Note: An example of a rubric is provided however, you may create one with your students if you choose.

Extensions:
Language Arts- Persuasive writing
History- Background of area
Government and Politics- City-Council Presentations
Art- Visual representations
Economics- Financial backing of programs
Math- Graphing of survey data
Speech- City-Council Presentations

Materials:
Overhead projector
Television and VCR
Graph paper
Survey data compilation sheet **Handout #1**
Homework page of essay question **Handout #2**
Maps of local area from Chamber of Commerce
Historical information about area from Chamber of Commerce and library
Guidelines for written proposal of program and presentations of proposals **Handout #3**
Brochures and information from community resources on already existing programs
Evaluation (Assessment) Rubric **Handout #4**
Glue
Scissors
Markers or Colored Pencils
Construction Paper
Poster Board
Magazines (pictures)

HANDOUT # 1

DATA COMPILATION SHEET FOR SURVEY

NAME:_____ **DATE:**_____ **PER:**_____

Compile and total the information from your groups surveys. After finding totals generate the percentages of each area by using the following formula:

Total # in the category
Total # of people interviewed then multiply by 100 = percentage(%)

Put the percentage totals in the chart below. Create a visual representation for this data.

Total # of people surveyed: _____

Total # of people who moved for desirability of location:

1970-1979:_____ 1980-1989:_____ 1990-Present:_____

Total # of people who moved for employment:

1970-1979:_____ 1980-1989:_____ 1990-Present:_____

Total # of people who moved for other:

1970-1979:_____ 1980-1989:_____ 1990-Present:_____

Place percentages in chart below:

REASON FOR MOVING	1970-1979	1980-1989	1990- Present
1. Desirability of location	%	%	%
2. Employment	%	%	%
3. Other	%	%	%

HANDOUT # 2

NAME:_____ DATE:_____ PER:_____

ESSAY QUESTION

Write a 2 paragraph essay, 1 paragraph for each part, using complete sentences to answer the following question.

How does the population growth of the area socially affect: 1) the community as a whole, and 2) you and/or your family individually?

HANDOUT # 3

NAME:_____ DATE:_____

SCENARIO and GUIDELINES FOR PROPOSAL

Scenario:

The community population is really rising and some social issues have started to surface. A local business, Good Time Charlie's, is allocating $500,000 to help the community alleviate some of these problematic issues in the community. Your job is to research and design an original proposal to provide potential solutions. This proposal will be presented to the Board of Directors of Good Time Charlie's in an attempt to convince them that your proposal is the "right" one.

GUIDELINES FOR WRITTEN PROPOSAL

1. The proposal must be in paragraph form, 2-3 pages, typed, in length and in a report folder.

   Be sure you have a cover sheet with the following information:

   Title of Proposal
   Names of participates
   Name of Teacher(s)
   Period
   Date

2. When writing the proposal be sure and answer the following questions:

   A. Where? Location of this program

   Where will the program actually take place? Inside, Outside, Church, YMCA

   What part of the community? Is it centrally located?

   What transportation is needed?

   B. Why this proposal? (What makes it so special?)

   What social issues does the program address?

   What activities are included in the program?

   What benefits does your plan contain that the others do not contain?

   What age group or groups is the plan designed to help? (Pop. Pyramid)

   Are the needs of the people in every part of the community being met?

   How would you attract the participates?

C. How will it work?

Who will run the program? (Parents, Young Adults, Students)

Are the workers volunteers or will they get paid?

How many days a week will the program run?

Will the program need equipment? If so what kind?

Will there be food and drinks? Where will it come from?

What would some of the rules and regulations include?

How would you enforce them? Would you need to enforce them?

D. Your last paragraph(s) should include the answer to the following question: How might the program or activities you have proposed help alleviate social problems now and in the future in other areas, as well as our own?

GUIDELINES FOR ORAL AND VISUAL PRESENTATION OF PROPOSAL

1. The presentation will be 10-15 minutes in length. You need to be clear and concise when describe it to the "Council".

2. You may use index cards to help you organize your thoughts however your proposal will **NOT** be read.

3. Everyone in the group must participate in the oral presentation of the proposal. You may divide it up any way you choose to do so.

4. You must have a visual part of the presentation. Examples: Video, brochure, drawings, transparencies. Anything that will help bring your proposal to "life".

5. Be sure you are nicely dressed.

HANDOUT # 4

PROPOSAL and PRESENTATION EVALUATION:

LET THE GOOD TIMES ROLL.....

TITLE OF PROPOSAL:_____

GROUP MEMBERS: _____

_____

PERIOD:_____ DATE:_____ GRADE:_____

DESCRIPTION OF CATEGORIES	POINTS WORTH	POINTS EARNED
1. CONTENT OF WRITTEN PROPOSAL		
A. All questions answered	_____	_____
B. Original ideas (creativity)	_____	_____
C. Clear and Concise	_____	_____
2. FORMAT OF WRITTEN PROPOSAL	_____	_____
D. Correct format (2-3 typed pages, cover sheet)	_____	_____
E. Grammatically correct (spelling, etc..)		
3. CONTENT OF VISUAL PRESENTATION	_____	_____
A. Included maps and charts pertaining to proposal	_____	_____
B. Shows relativity to proposal	_____	_____
C. Reflects Effort		
3. CONTENT OF ORAL PRESENTATION		
A. All areas covered	_____	_____
B. 10-15 minutes in length	_____	_____
C. Participation by all group members	_____	_____
D. Presented proposal with credibility	_____	_____
E. Answered questions confidently	_____	_____
F. Clear, Concise and Persuasive Argument(s)		

TOTAL POINTS EARNED:_____

COMMENTS:_____

_____

The Renaissance of Recycling

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Sharon Stuhlreyer, Cy-Fair High School, Cypress, Texas

Description:

This lesson has students analyze their school's recycling program. Upon analysis students will determine if improvement is necessary and propose solutions to better utilize the recycling program.

Grade Level:

High School

Purpose:

To allow students an opportunity to examine the school's recycling program and provide an opportunity educate their peers and community as to how to increase recycling in the school.

Texas Essential Knowledge and Skills (TEKS) draft:

1A identify and give examples of different points of view that influence the development of public policies
1 C compare different points of view on geographic issues
3 A map the locations of different types of economic activities
3 B identify how factors affecting the location of different types of economic activities
10 A explain the interrelationships among physical and human processes that shape places
19 A use historical, geographical and statistical information from a variety of sources
19 B analyze and evaluate the validity of multiple sources of geographic information
19 C construct and interpret maps and other graphics
20 A design and draw appropriate maps and
20 C use geographic terminology correctly
21 C use a problem- solving process
21 D use a decision making process

Connections to National Geography Standards:

1 how to use maps and other Geographic representations
4 the physical and human characteristics of places
9 the characteristics, distribution, and migrations of human populations
14 how human actions modify the environment
17 how to apply Geography to interpret the past
18 how to apply geography to interpret the present and interpret the future

Fundamental Themes
Place
Location
Human-Environmental Relations
Movement

Objectives:
The learner will

1. Identify materials that can be recycled
2. Examine personal recycling habits
3. Locate and analyze recycling bins in the school
4. Survey, analyze, and translate information into a graphic display of community recycling habits
5. Propose and implement a lore effective recycling program
6. Produce public service messages concerning recycling

****

Procedures:
Day 1
Preparation: Teacher should save the contents of the trash can from the previous day. A table is needed in the front of the room.

1. Dump the contents of the trash can onto table in the front of the classroom. Begin showing the items to the students one at a time, organizing them into recyclable and non-recyclable piles. Do not immediately tell the students the categories you are dividing the materials into. Have them analyze the distribution of these materials. Once the students have determined the categorization patters allow them to come up and choose an item and to put into the proper category.

2. Ask students the following questions:
   -Motioning to the pile of recycled materials What can we do with all the these materials?" (response hopefully will be recycle them)
   - Do we have a recycling program at our school? Yes
   - What do you know about our recycling program? Discuss with class

3. Break the class into groups of five. Ask the class to brainstorm in their groups why they think the material that could be recycled was in the trash even though a recycling program exists.

4. Discuss the above question with the class. Also discuss with the class if they think it is important to recycle.

5. Place "Elephant Formulas" transparency on the overhead. Using guided practice direct the students through the following g problem. Ask the students how

many bottles of soda they drink in a day. Using the formula given, solve the problem. The estimate of the average elephant weighing 8,000 lbs will be used. (see attachment 2 for formula transparency.)

***** If you feel it would be more effective for your students to do this activity with cars instead of Elephants, the formula for cars is also available*******

6. On a poster board paste the number of Elephants that are thrown away each year in regards to the amount of soda bottles the class throws away.

Closure: Ask for reactions or comments from students. Tell the students they will have an opportunity to create one of these posters tomorrow using other recyclables.

****

Day 2

Preparation- Students will need construction paper, glue, scissors, large drawing paper, and a calculator.

1. Allow the students to get back into their groups. Pass out the elephant formula and materials. Review procedures from the example given in class the previous lesson. Have students work in their groups to create an elephant poster. Assign each group a different recyclable material: glass, cardboard, paper, aluminum, and milk cartons. Have students share results when complete. See attachment 1 for elephants to be pasted. Copy as needed.)

2. Ask students what they know about surveys. Discuss with students what questions they would ask to learn about recycling habits in the school. Allow students to brainstorm in their groups. Tell the students they will be creating a survey to give to other students, faculty and staff in the school. Tell the students that they will need to have 5 questions per group for tomorrow. (See attachment 3 for an example of a survey.)

Homework- complete questions

****

Day 3

Preparation-Teacher needs to provide a scale (a typical bathroom scale will work).

1. Turn in survey questions. Teacher will compile these questions and create the survey.

2. Take the students on a tour of the school to locate the school's recycling Bins. Weigh the materials that are in each bin. Student's need to write down the location of each recycle bin, what type of material is in the bin, and the weight of that material.

****It is very important that you look around the **entire** school for recycling bins.****

****

Day 4

Preparation- Each student will need large drawing paper and map pencils.

1. Provide students with the drawing paper and have them draw a map of the school. Students need to plot the location of recycling bins, the amount of material in each bin, and the type of material. Students are free to chose the manner in which they display this information. However, just listing the information is not an option. Show examples to student's as to how they could display the information (graduated circles, color, etc.).

2. Pass out the surveys. Tell the students they need to give the survey to three individuals, preferably a mix of students, faculty, and staff members. These needs to be brought to class with them the next day.

Homework- Complete maps, hand out surveys.

****

Day 5

Preparation- Make sure students' mental maps are available.

1. Allow students to get back in their groups. Tell students they need to analyze the results of their survey. On graph paper create a bar graph for each question from the survey. Ensure that the students are using the same graph paper and scale. (See attachment 4)

2. Post each groups bar graphs on the wall. They should be in columns (first column question #1, second column question #2 etc.)

3. Have a class discussion and compare the results of the survey. Students should determine if there are any patterns of recycling among all the graphs.

4. Have students look at their maps of the school. Have students determine if there is any type of relationship between the survey and the map. Students should be looking for correlation's or relationships among the graphs.

****

Day 6

1. Use class period to discuss the results of the surveys. The students should brainstorm ways in which to convey the importance or need for improving the recycling program in the school.

2. Introduce the idea of PSAs (Public Service Announcements) and discuss the

different types. Introduce the PSA project. (See attachment 4.)
See evaluation/assessment category below.

Closure: Tell students to be thinking of possible ideas for their PSA and handout a recycling fact sheet that may be used to spur ideas. (See attachment 5.)

****

Days 7-8
Preparation: Have necessary materials available for students to create PSAs.

1. Class time for the next two days will be devoted to the students working on their PSAs.

****

Day 9-10
1. Students will make presentations of PSAs.

****

Classroom Time: approximately 2 weeks

Evaluation (Assessment): Student assessment will be determined through the PSA. A student generated rubric should be used for the assessment.

Extensions: * At the end of the year the students may want to analyze the effectiveness of their PSAs by measuring recycled goods and handing out the same survey and analyzing the results.
*View the ABC's of School Recycling
*Rewrite the poem Sarah Cynthia Sylvia Stout Would Not Take the Garbage Out using a recycling theme.

Materials: large drawing paper, map pencils, scale, glue, scissors, and appropriate materials necessary for PSAs (i.e. video camera, tapes, props...materials will vary according to student choice of PSA.)

Special note to teachers: We realize it is very difficult to find two weeks to teach a lesson on recycling. This lesson was created in a manner that will allow the teacher to pick and choose certain activities, thus controlling the amount of time spent on this lesson. There are four main activities (Surveying, mapping, recycled materials posters, and creating PSAs) in this lesson. For this lesson to be most effective we feel all activities should be utilized, however you as the teacher should determine what will be most effective in the time you have for the lesson.

Sources:

Attachment 1

Trash Facts
Waste Policy Center
211 Loudoun Street S.W.
Leesburg, VA 20175-2718

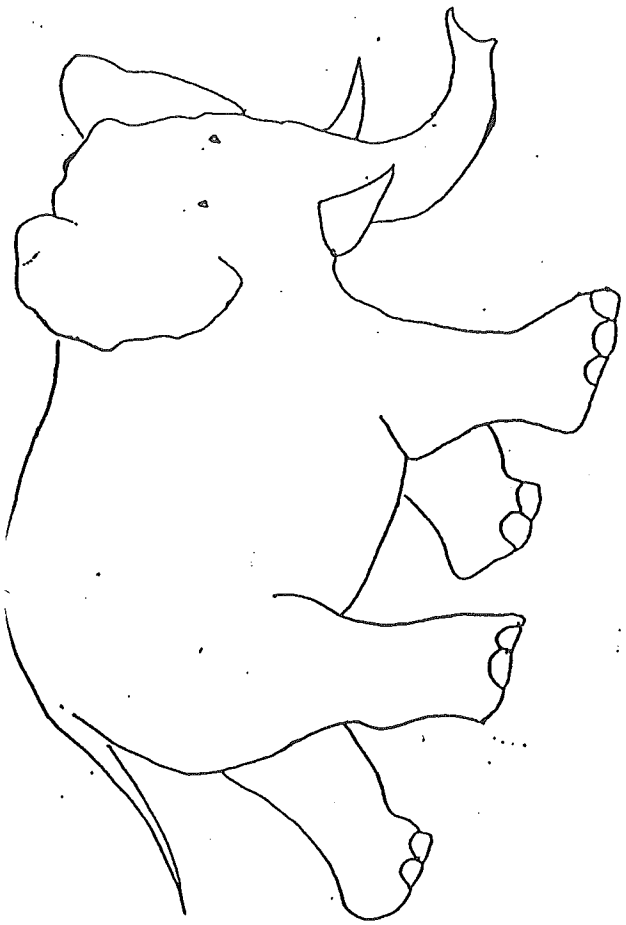
Waste Wise
The Aseptic Packaging Council
P.O. Box 3794
Washington, D.C. 20007

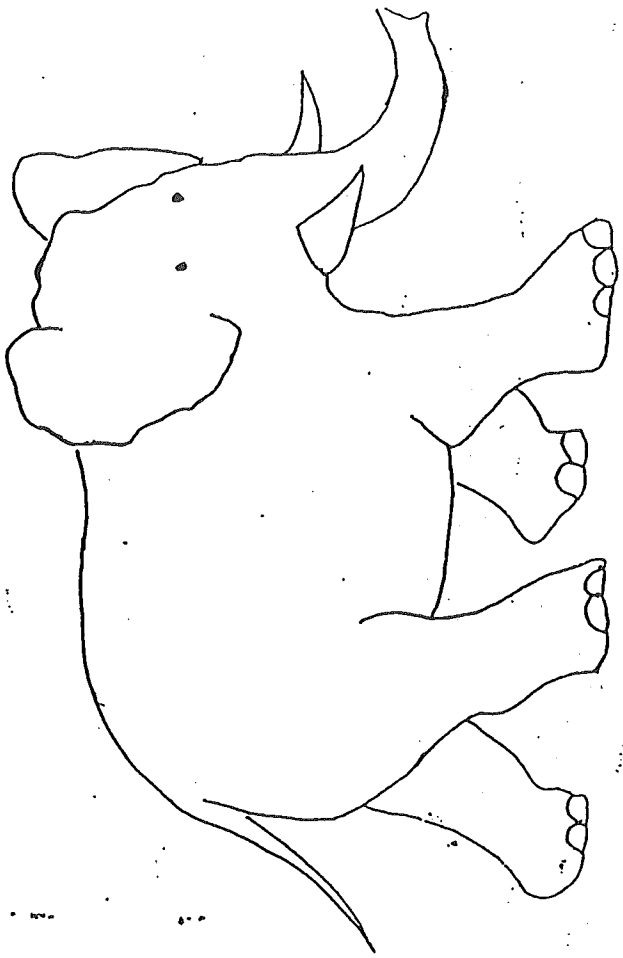
The ABC's of School Recycling
TNRCC
P.O. Box 13087
Austin, TX 78711-3087
1-800-64TEXAS

Let's Reduce and Recycle: A Curriculum Guide for Solid Waste Awareness
U.S. EPA
401 M Street, S.W. MC 5305
Washington, D.C. 20460

Also:

Diconsiglio, John. "Rethinking Recycling", *Update*. March 21, 1997 pp10-11.
Silverstein, Shel. "Sarah Cynthia Stout Would Not Take the Garbage Out", Where the Sidewalk Ends Harper & Row. 1974.





Attachment 2

ELEPHANT FORMULA

FYI: The average elephant weighs 8,000 lbs.
The average plastic soda bottle weighs 1/2 an ounce. One pound equals 32 soda bottles.

1. Find the average number of bottles used by one student in a week.

2. Multiply the above # by the # of students in the school.
(This is the # of soda bottles used by students in the school.)

3. Divide the number by 32.
(Reminder: 32 is the # of soda bottles in a pound)

4. Now take the result above (# of pounds of soda bottles used by students in the school for one week) and figure the result for one year.
(Reminder 52 weeks in a year).

The result is the weight of soda bottles discarded by the students of your school. Now, let's carry this one step further. Figure out how many elephants the weight of the soda bottles would be equivalent to.

5. Divide the weight of soda bottles by one elephant.

Result: Our schools discarded soda bottles = _____ elephants!

Use the following figures to compute your school's totals:

*The average aluminum can weighs 1/60th of a pound. There are 60 cans in a pound.
*The average cardboard box (let's use a shoe box) weighs 1/4th of a pound. There are 4 shoe boxes in a pound.
*It takes approximately 100 sheets of paper in a pound.
*The average glass bottle weighs 1/4th of a pound. There are 4 glass bottles in a pound.
*The average half pint milk carton weighs 1/50th of a pound. There are 50 milk cartons in a pound.

CAR FORMULA

FYI: The average car weighs 2,500 lbs.
The average plastic soda bottle weighs 1/2 an ounce. One pound equals 32 soda bottles.

1. Find the average number of bottles used by one student in a week.

2. Multiply the above # by the # of students in the school.
(This is the # of soda bottles used by students in the school.)

3. Divide the number by 32.
(Reminder: 32 is the # of soda bottles in a pound)

4. Now take the result above (# of pounds of soda bottles used by students in the school for one week) and figure the result for one year.
(Reminder 52 weeks in a year).

The result is the weight of soda bottles discarded by the students of our school. Now, let's carry this one step further, figure out how many cars the weight of the soda bottles would be equivalent to.

5. Divide the weight of soda bottles by one CAR.

Result: Our schools discarded soda bottles =_____ cars!

Use the following figures to compute your school's totals:

*The average aluminum can weighs 1/60th of a pound. There are 60 cans in a pound.
*The average cardboard box (let's use a shoe box) weighs 1/4th of a pound. There are 4 shoe boxes in a pound.
*It takes approximately 100 sheets of paper in a pound.
*The average glass bottle weighs 1/4th of a pound. There are 4 glass bottles in a pound.
*The average half pint milk carton weighs 1/50th of a pound. There are 50 milk cartons in a pound.

The Renaissance of Recycling
Public Service Announcement Guidelines

A Public Service Announcement (PSA) is a form of communication relaying specific information to the public. For the purpose of this project the PSA will be concerning recycling. A PSA needs to convey a message in an interesting manner that will grab the attention of the target audience. There are a variety of ways to create a PSA. Examples include: brochures, posters, video presentations, skits, plays, songs, raps, comics, and poems. There is no limit to the creativity that may be used when developing your PSA.

This sheet must be turned in with your groups PSA. All members of the group must have there own paper.

Your name _____

Type of PSA _____

Group members _____

_____

The following is the criteria that will be used for grading the PSA.

Evidence of knowledge concerning recycling _____

Effort _____

Neatness, creativity _____

Bibliography _____

Each group member must have at least two different sources of information concerning recycling.

Active participation in the PSA _____

On the back of this paper I want you to write a brief description of your role in the creation of your PSA. I would also like your opinion as to whether you feel this was a valuable learning experience (Your opinion is not going to affect your grade so please be honest). Finally, suggest ways this project could be improved. Remember there is always room for improvement.

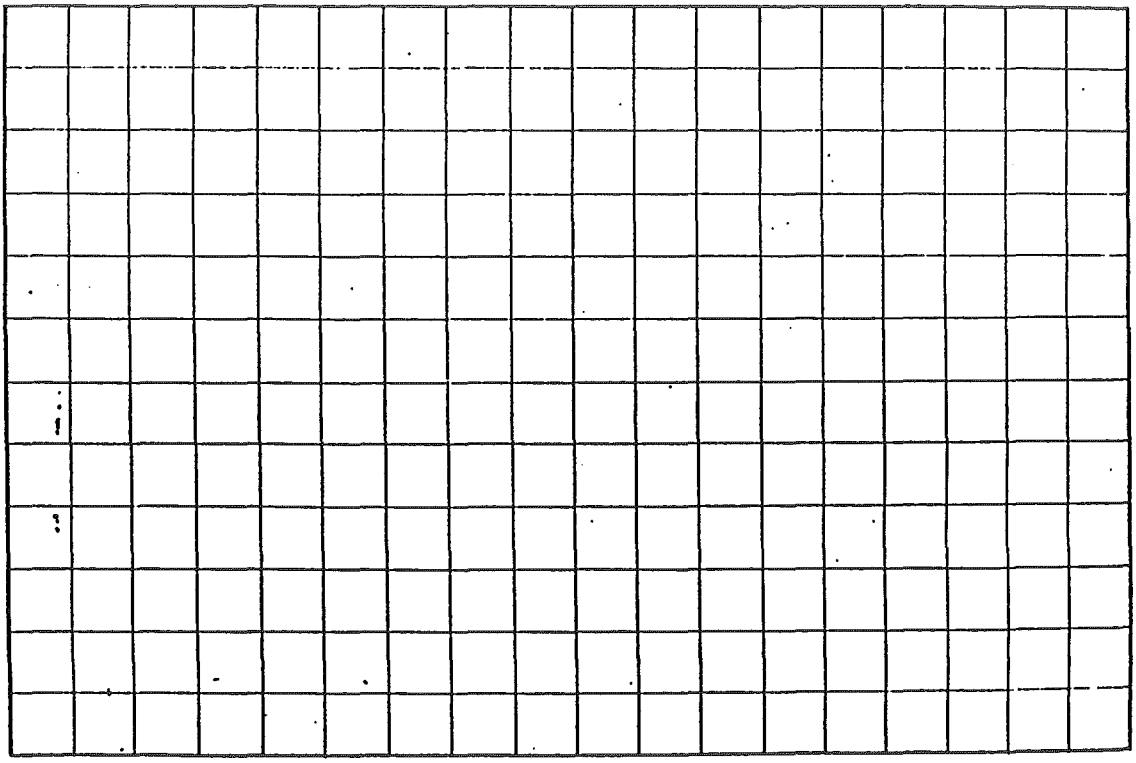
I feel I deserve the grade of _____ because.....

Public Service Announcement

Directions/Ideas

A Public Service Announcement is a form of communication relaying specific information to the public. For the purpose of this project the PSA will be concerning recycling. A PSA needs to convey a message in an interesting manner that will grab the attention of the target audience.

There are a variety of ways to create a PSA. Examples include: brochures, posters, video presentations, skits or plays, songs, ect. There is no limit to the creativity that may be used when developing a PSA. However, when developing the student developed rubric, it may be easier to choose one form of PSA for assessment purposes.



Example Graph Paper For Surveys. (Should Be Enlarged)

RECYCLING FACTS

*By recycling one aluminum can one saves enough electricity to power your TV for three hours!

*By recycling one ton of paper enough electricity is saved to power an average size home for six months!

*In 1960 Americans disposed of 2.7 lbs of waste per person per day, by 1990 that number went to 4.3 lbs per person per day!

*In 1970 there were over 20,000 landfills that number dropped to 4,000 in 1993!

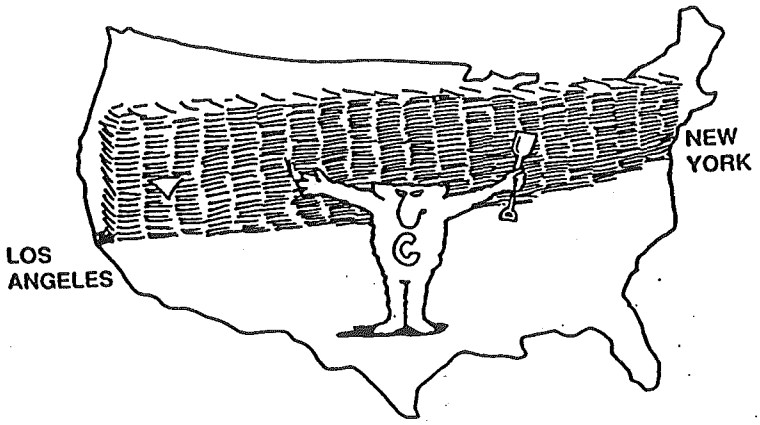
*The Sunday *New York Times* uses 75,00 trees!

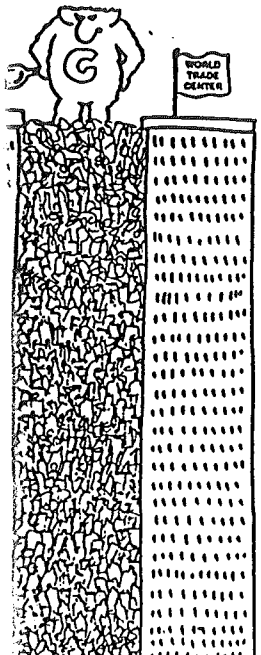
*Packaging makes up 32% of all municipal waste!

*We throw away 2.5 million plastic bottles every hour (22 billion plastic bottles a year)!

*We throw away 31.6 million tons of yard waste each year!

*With the office and writing paper we throw away every year, we could build a 12 foot high wall from Los Angeles to New York City!

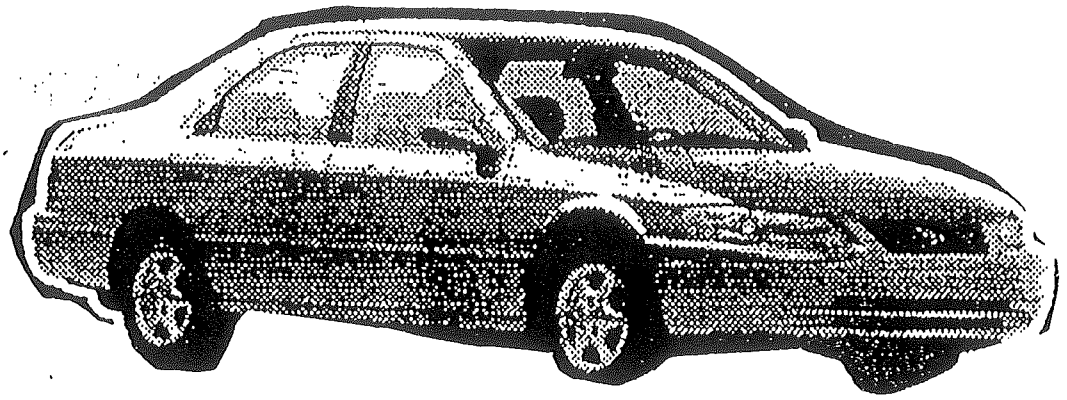


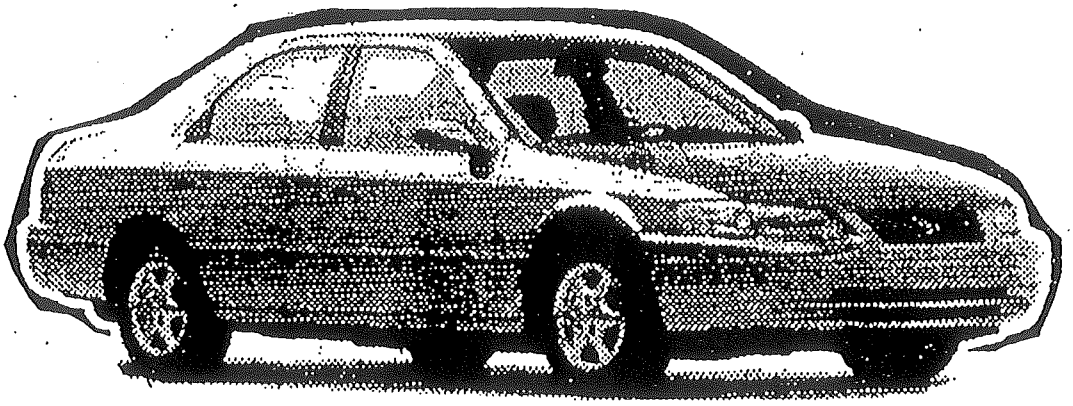


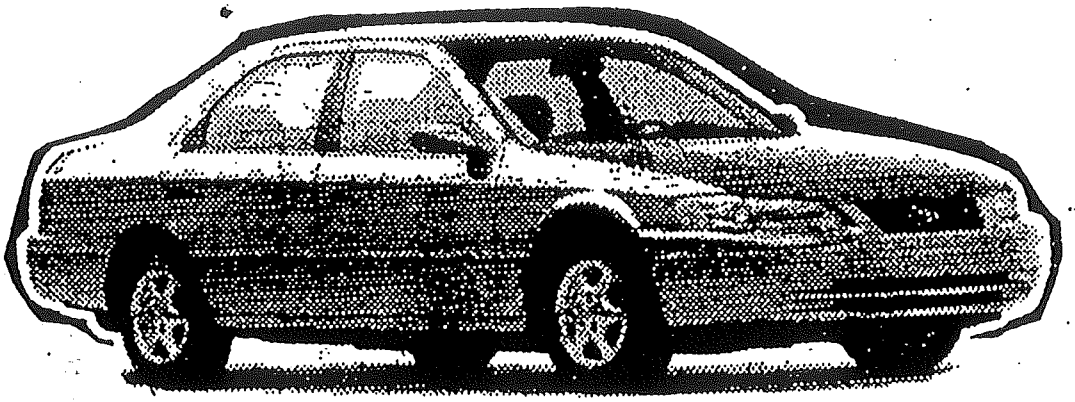
*With the aluminum we throw away in three months the United States could rebuild its entire commercial airfleet!

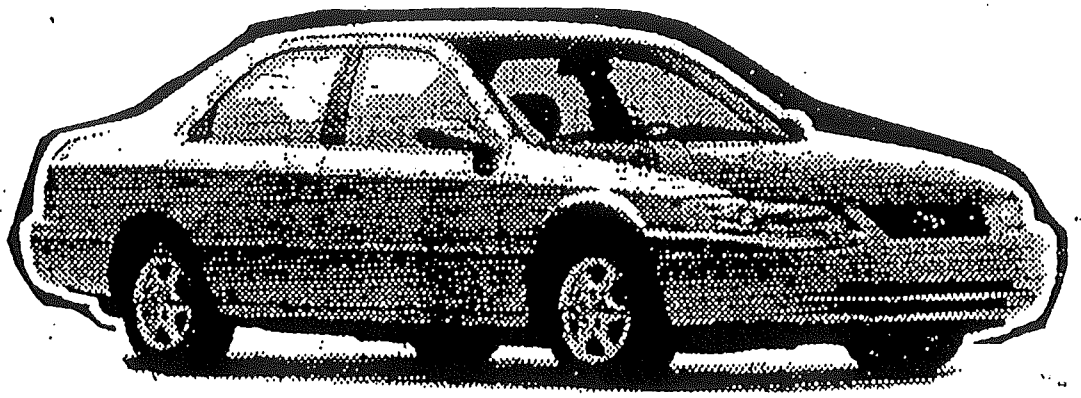
*We throw away over 200 million tires every year (that's 1 for every person in the U.S.)!

*Every two weeks we throw away enough bottles and jars to fill the 1,350 feet high twin towers of New York's World Trade Center!!









WHEN EL NIÑO CRIES .....

NAME:
Frances Talbot, Killeen High School, 500 N. 38th St., Killeen TX 76543
Sue Peay, Edison High School, 701 Santa Monica, San Antonio TX 78212

DESCRIPTION:
This lesson will explore and analyze the impact of El Niño on a global scale.
NOTE: This may be used as a part of a unit dealing with human-environmental interactions, a unit on Oceania, or incorporated into a cross-curriculum topic with Science.

GRADE LEVEL:
High school.

PURPOSE:
To increase the students' awareness of nature's impact on man and to build their geographic proficiency as outlined in *Guidelines for Geographic Education.* Using a global-based problem solving lesson, the student will:

1. ask geographic questions
2. acquire geographic information
3. organize geographic information
4. analyze geographic information
5. answer geographic questions.

TEKS:
The students:

3B. describe physical environment of regions and the physical processes that affect these regions such as weather, tectonic forces, wave action, freezing and thawing, gravity, and soil-building processes.

8C. describe the impact of and analyze the reaction of the environment to abnormal and/or hazardous environmental conditions at different scales such as El Niño, floods, drought, and hurricanes.

8D. analyze statistical and other data to infer the effects of physical and human processes on patterns of settlement, population distribution, economic and political conditions, and resource distribution.

19B. analyze ways that technological innovations have allowed humans to adapt to places shaped by physical processes such as floods, earthquakes, and hurricanes.

21A. use historical, geographic, and statistical information from a variety of sources such as databases, field interviews, media services and questionnaires to answer geographic questions and infer geographic relationships.

21C. construct and interpret maps to answer geographic questions, infer geographic relationships, and analyze geographic changes.

22A. design and draw appropriate maps and other graphics such as sketch maps, diagrams, tables, and graphs to present geographic information including geographic features, geographic distributions, and geographic relationships.
22B. apply appropriate vocabulary, geographic models, generalizations, theories, and skills to present geographic information.
22C. use geographic terminology correctly.
22D. use standard grammar, spelling, sentence structure, and punctuation.
23A. plan, organize, and complete a group research project that involves asking geographic questions; acquiring, organizing, and analyzing geographic information; answering geographic questions; and communicating results.
23C. use a problem-solving process to identify a problem, gather information, list and consider options, consider advantages and disadvantages, choose and implement a solution, and evaluate the effectiveness of the solution.

CONNECTIONS TO NATIONAL GEOGRAPHY STANDARDS:

1. Maps and other geographic representations, tool, and technologies to acquire, process, and report information from a spatial perspective.
7. Physical processes that shape the patterns of earth's surface.
15. Physical systems affect human systems.

FUNDAMENTAL THEMES:

Location
Place
Movement
Region
Human-environment relations

OBJECTIVES:

Students will be able to:

1. strengthen research skills by locating information on El Niño occurrences.
2. use maps with geographic information and tools to interpret patterns of El Niño's effects.
3. analyze and synthesize possible solutions to problems caused by El Niño.
4. evaluate actions currently used to cope with the damage from El Niño as well as other possible strategies for recovery and for lessening future impacts.

PROCEDURES:

DAY 1

1. Write the phrase "El Niño" on the board. Ask students questions such as: What does it mean? Where would we find this phenomenon? Who would be interested in this? Why? ..... Write their responses on the board. (3-5 min.)
2. Use these as a lead-in to discuss the El Niño phenomenon, being sure to point out the ocean current-wind current relationship. (5-10 min.)
3. Divide class into study-buddy (2 student) groups.
4. Distribute one project packet to each group. This includes: global map, "starter" data (2 sheets), data table page, "think tank" page, bibliography, and rubric.

5. Read instructions with the class and clarify any questions on the project. Review the rubric with the class. (5-10 min.) Each group will gather information, log it on the data page, and map these locations. With the acquired data, they will look for patterns and write their findings. Based on these, they will consider current "solutions." They also will brainstorm possible recovery methods and ideas to lessen future effects of El Niño. In conclusion, they will reflect how El Niño personally affects them.
6. Have students use their textbooks and/or atlases to draw ocean currents, then mountains and deserts, onto their maps. (20-25 min.)
7. After students have finished this task, lay the El Niño transparency (TR.3) over the global map (TR.1) and ocean currents (TR.2) transparencies. Students will add these to their maps. This will give them further locational understanding to use in analyzing data and reaching conclusions. (3-5 min.)
8. Review data page instructions with students (symbol, date of the article, location of the occurrence, problem caused, and effects). Ask them to share how they might set up a data table. Sketch their ideas on the board. (3-5 min.)
9. To model the process of taking data from source to table, use "Earthweek" transparency (TR.4) on overhead. Have students help extract data from the article. Write these onto student- designed chart on board. (5 min.)
10. As groups begin investigating newspaper reports of El Niño occurrences, monitor groups and give guidance / answers to students' questions. (20 min.)

DAY 2

1. Allow discussion time for any questions or problems that students have encountered thus far in their projects. (5-15 min.)
2. Students continue their assignment in the classroom or in the library, as determined by access to Internet and standard resources.

DAY 3 (This can be a few to several days later to allow for independent work.)

1. Distribute round-robin papers to students.
2. Presentations: In a round-robin format each group offers one observed pattern or one conclusion drawn during their investigation. Students also share their "solutions" to El Niño's effects and discuss these. During this time, each student writes down (on the "robin" paper) any patterns, observations, conclusions, and "solution" ideas that are different from those of his/her group.
3. Ask students to name ways that El Niño personally impacts them. Write these on the board.
4. To end the lesson, have students give examples for each of the five themes of geography.

CLASSROOM TIME:

3 class periods.

EVALUATION:

A rubric will be provided to assess performance in mapping, research, and critical thinking skills.

EXTENSIONS:

This lesson can be:

1. part of an ongoing lesson with a unit on environmental issues and how they impact humans.
2. part of a unit on Oceania.
3. an interdisciplinary topic with Science.

MATERIALS:

1. Group project packets to include:
   - ... global political map
   - ... "starter" data sheets (2) comprised of "Earthweek" articles
   - ... data table page
   - ... "think tank" page
   - ... bibliography
   - ... rubric.
2. Atlases.
3. Colored pencils.
4. Overhead projector with extension cord.
5. Transparencies:
   - ... TR.1 global map
   - ... TR.2 ocean currents
   - ... TR.3 El Niño locations
   - ... TR.4 "Earthweek" sample (optional)
6. Paper for round-robin notes.
7. "Ballad of El Niño," Eric J. Groves ...to be used at teacher's discretion.

RESOURCES

Philander, S.G.H., 1990: El Niño, La Niña and the Southern Oscillation, Academic Press, San Diego, CA, 289 pp.

"Earthweek," Steve Newman, San Antonio Express-News, every Monday, "Science" page of the "Business" section, www.earthweek.com
E-mail addresses = earth@wco.com and earth@slip.net.

"El Niño and Climate Prediction," John M. Wallace and Shawna Vogel, Reports to the Nation, University Corporation for Atmospheric Research, Spring 1994, No. 3, 24 pp.

"The Wrath of El Niño," Shannon Brownlee and Laura Tangley, U.S. News and World Report, 1997 October 6, pp.16-22.

Center for Ocean Atmosphere Prediction Studies, http://www.coaps.fsu.edu/lib/elninolinks.

Climate Diagnostics Center, http://www.cdc.noaa.gov/ENSO/enso.current.html

Climate Prediction Center (NCEP), http://nic.fb4.noaa.gov

NASA/Goddard Space Flight Center Seasonal to Interannual Prediction Center, http://nsipp.gsfc.nasa.gov/enso/nino/

PBS/NOVA Web Site, http://www.pbs.ofg/wgbh/nova//elnino/anatomy/

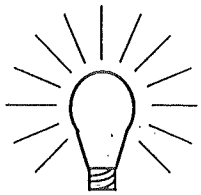
"What is an El Niño?" U.S. Dept. of Commerce, NOAA/PMEL/TAO/El Nino Theme

DATA TABLE

Design your own table to record data. Include <u>all</u> of the following:

a **symbol** to represent the problem or benefit (same as on your map), **date** of the article, **location** of the occurrence, **problem** caused by El Niño, and the **effect** (damage or benefit) of that problem.

THINK TANK



Answer the following in **paragraph** form, using **complete sentences.**

1. Do you see any patterns on the map? If yes, what kinds of patterns are there? Where are they?
2. What "solutions" are used to deal with the effects of El Niño?
3. Brainstorm and develop other possible methods to help recovery and to lessen future impacts of El Niño.
4. In what ways does El Niño personally affect you?

On the other side of this paper, list your bibliography. You must have at least 2 Internet sources with addresses and 3 newspaper and/or magazine sources beyond those in the "starter" data pages. Write your sources as the examples show.

For newspaper or magazine articles:

"name of article," author, name of source, date (year month date), pages where found.

For Internet sources:

"name of article," author, web site address.

BIBLIOGRAPHY

MAGAZINES

NEWSPAPERS

INTERNET

SCORECARD

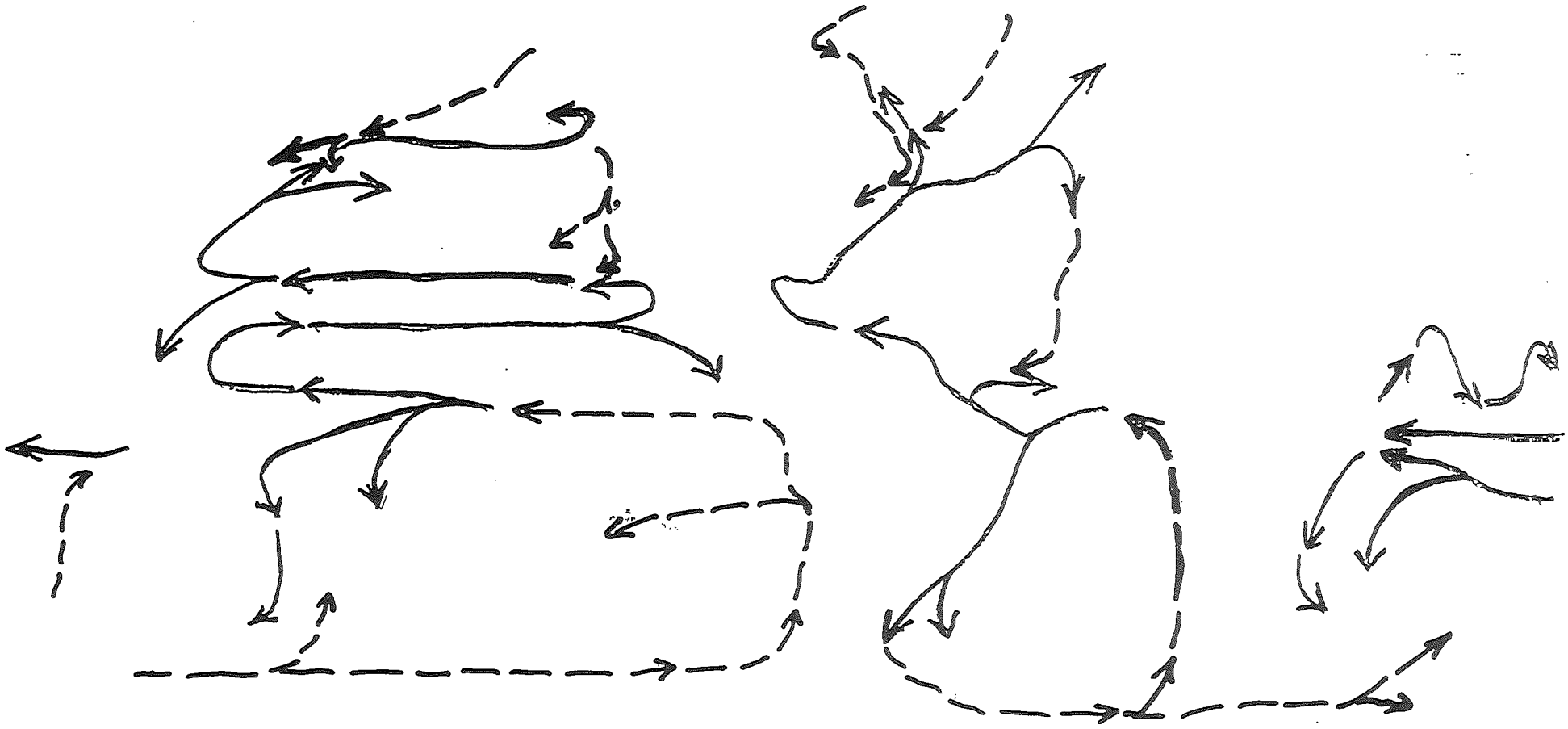
Use this as your cover sheet when you turn in your group project.

	POSSIBLE POINTS	YOUR POINTS
MAP (25 points)		
...TOADLS (title, orientation, authors, date, legend, scale)	5	_____
...ocean currents	5	_____
...El Niño locations	5	_____
...label regions	5	_____
...neatness	5	_____
DATA TABLE (10 points)		
...headings (symbol, date, location, problem, effect)	5	_____
...neatness	5	_____
THINK TANK (50 points)		
...patterns	10	_____
...current actions or "solutions"	10	_____
...possible recovery methods and ideas to lessen impacts	20	_____
...personal impact	10	_____
BIBLIOGRAPHY (5 points)		
...newspaper and/or magazine sources	3	_____
...Internet sources with addresses	2	_____
PRESENTATION		
...notes	10	_____
TOTAL	100	_____
EXTRA CREDIT (maximum of 25 points)		
...extra article (or article summary)		_____
...		_____
YOUR SCORE		_____

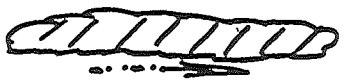
COMMENTS

WORLD MAP

TR.2: GLOBAL OCEAN CURRENTS



→ WARM CURRENTS
- - → COLD CURRENTS




?


EL NIÑO

THE BALLAD OF EL NIÑO

There are strange things done in the tropical sun
Things that are never foretold
The ocean trails have their secret tales
That would make your blood run cold
The richest dictator along the equator
No matter how much he is worth
Is stricken with fear when it is the year
Of El Niño, the scourge of the earth.

In the Lima café where the heat of the day had boiled the beer to a bubble
The old man arose and he wrinkled his nose as he scented the first hint of trouble.
The bartender said with a tilt of his head, "Another cervesa, Señor?"
The old man said "No" as he hung his jaw low and sadly he walked out the door.

In the ocean Pacific was something specific but no one could figure the force.
Trade winds that blow east unexplainably cease; warm water reverses its course.
The thermocline dips and the climate soon flips and the weatherman said without doubt:
"We're in for a flood and a slide made of mud and famine and fires and drought."

Argentinian ants took a militant stance as they forded the Rio on rats.
Soon they were able to gnaw through the cable that carried the stock market stats.
Brokers nocturnal rushed out for a Journal to measure the depth of the tumble.
Smart money sold short and said with a snort, "El Niño, the ultimate rumble".

On the outskirts of town the Wal-Mart blew down and sons of Sam darkly scowled.
But then came the freeze and they fell to their knees; the Tickle Me Elmo dolls howled.
The fastest food store soon collapsed in a roar as the deep fat fryers congealed.
The neon signs hissed as the tornadoes kissed; the wrath of El Niño revealed.

Where glass towers gleamed the MBAs schemed re: who was the best one to blame.
Someone gave a shout "The computers are out!" and each of the suits lost his name.
The insurance execs made off with their checks but all of the banks were adrift.
They said not a word for they'd seen what occurred: El Niño is certain and swift.

In hospital wards the people in hoards lined up for a dose of abuse
And the HMO's and the PPO's gave each one a different excuse.
With the system corrupted the patients erupted and stormed through the pharmacy door.
To be quite exact, they gulped all the Prozac and smiled "El Niño's a bore".

Sixteen Beanie Babies, infected with rabies, appeared on a TV talk show
"You're not to blame for your terrible shame", said the host, and she seemed to know.
"Abuse as a child is what drove you wild, and what do you think made it worse?"
"El Niño, of course, that mysterious force, the twentieth century's curse."

The merchants of hate had a lot on their plate as the hurricane's eye came ashore.
Televangelists pleaded and said that they needed at least twenty-five million more.
"It's those guys and those gals who are much more than pals; I think you know who I mean.
El Niño's a sign that they're all out of line; send money! We'll make them come clean!"

So if you need a reason this holiday season to justify something you've done,
Or you want to evade some mistake that you've made and there isn't a place you can run:
No need for confessing. El Niño's a blessing. It's there to be blamed and its free!
Swallow your piety; dump your anxiety; if you have questions, call me.

There are strange things done in the tropical sun
Things that cannot be foretold
The ocean wails with its secret tales
That would make your blood run cold
The richest dictator along the equator
No matter how much is his worth
Is riddled with fear when now comes the year
Of El Niño, the scourge of the earth

—Eric J. Groves

July 21, 1997

El Niño Update

Further rises in sea-surface temperatures off South America are altering global weather patterns as the above-normal heat from the Pacific is becoming absorbed into the atmosphere. Recent record high temperatures in Alaska and northern China are probably linked to the phenomenon. China's most severe heat wave this century produced temperatures well above 100 degrees Fahrenheit, and killed more than 50 people in areas from Beijing to the port of Tianjin.

In Indonesia, farmers are reporting crop losses from a developing drought that was predicted earlier this year as a result of El Niño.

Japanese Cloudbursts

Two weeks of torrential rainfall and severe lightning storms across Japan have unleashed several rounds of flash floods and deadly mudslides. The country's worst natural disaster of the year occurred when tons of mud and rocks swept over the sleeping village of Harihara, killing 21 people. Houses were buried up to the rooftops when the side of a mountain broke loose without warning in the middle of the night.

Another landslide near Kobe killed a family of four when their home collapsed beneath the weight of flowing mud and debris.

Earthquakes

A moderate earthquake rocked Panama's border with Costa Rica, causing minor damage and sending panicked residents rushing into the streets. No injuries were reported.

Earth movements were also felt in south-central Alaska, the Greek islands of the Aegean Sea, northern Algeria, the Chile-Argentina border area, central Colombia, northern Taiwan, metropolitan Tokyo, the Kuril Islands and eastern Romania.

Aug. 25, 1997

Tropical Storms

Typhoon Winnie first drenched parts of the Philippines, then moved north to strike southern Japan, Taiwan and the Chinese mainland near Shanghai. At least 289 people were killed across the western Pacific during the storm's week-long rampage.

Remnants of tropical storm Ignacio drenched parts of Northern California with record rainfall for August. Typhoon Yule churned the open waters of the western Pacific, while tropical storm Zita formed over the South China Sea. It was expected to strike the southwest Chinese coast late in the week.

Earthquakes

A sharp magnitude 5.8 temblor rocked a wide area from Indonesia's Sumatra Island to parts of southern Thailand. The shaking caused widespread panic, but produced no significant damage or injuries.

Earth movements were also felt in northern Japan, southern Iran, southeast Cuba, interior Alaska, eastern Tennessee and parts of Southern California.

El Niño Storms

The El Niño ocean warming, focused along the tropical coast of South America, continued to spawn severe storms onshore. A violent four-day tempest killed at least 10 people and destroyed roads and bridges in central Chile. Rainfall totals were up to 10 times the normal amount that the area usually gets in an entire year.

In the Peruvian Andes, snowstorms and freezing temperatures have killed about 2,500 alpacas. The mayor of Virundo, a town in the southeastern highland region of Apurimac, said the population of the llamas had been cut in half.

Warming Bonus

Unusually hot weather in Europe, possibly caused by global warming, has produced the earliest harvest of grapes in nearly a century for France's Bordeaux region. The harvest began a month early under a scorching sun, and some vineyards are predicting the 1997 vintage will be the best in a hundred years.

Jan. 12, 1998

Cyclone Season

The tropical cyclone season heated up in the South Pacific with three storms being spawned by the ongoing El Niño ocean warmth. Cyclone Susan brought gale-force winds to the island nation of Vanuatu, with one person being killed by an uprooted coconut tree. The storm threatened Fiji late in the week. Cyclone Katrina was predicted to bring more high winds to Vanuatu as it moves eastward across the Coral Sea.

The French territory of Wallis and Futuna was lashed by high winds from passing cyclone Ron, but no injuries occurred during the storm.

African Inundations

The severe flooding that has struck parts of East Africa since last October subsided in some areas, but aid workers say that ongoing rains are causing the situation to remain serious in southern Somalia. Food shortages and acute health problems are occurring not only due to the inundations, but also because the area's entire water and sanitation system has failed. According to the UN World Food Program, there are pockets of land from which the water can only recede through evaporation, a process that may take months to occur and make the areas inhabitable. Waterborne diseases such as cholera have killed at least 1,904 people since the torrential rains first struck.

Southern Blazes

Rain and cooler temperatures spreading across eastern Australia helped firefighters bring under control some of the worst blazes to strike the region in 30 years. One firefighter was killed and seven others barely escaped with their lives when a sudden weather shift sent a firestorm rushing at them at a remote bushfire in New South Wales.

Jan. 26, 1998

Camel-llama Crossbreed

Rama, the world's first ever cross-breed between a camel and a llama, was born at a research facility in the United Arab Emirates. The 15-pound male Rama was conceived by artificial conception at Dubai's Camel Reproduction Center. The animal is the first link between camels and llamas since the two species split 30 million years ago and went their separate evolutionary ways. Rama looks more like his camel father with short ears and a long tail. However, his cloven hooves are those of a llama.

African Floods Return

Another round of destructive flooding spawned by the El Niño ocean warming struck parts of East Africa. At least 94 Kenyans died in flood-related accidents during what is normally the dry season. Overflowing rivers also washed out highways, including the main link between the capital of Nairobi and the Indian Ocean port of Mombasa.

Rift Valley Fever

Renewed flooding in eastern Africa is expected to worsen an outbreak of a rare mosquito-borne disease that has already killed more than 450 people in Somalia and Kenya since the flooding began in October. Rift Valley Fever usually affects only livestock, but when massive flooding occurs, the number of disease-carrying mosquitoes soars, threatening the human population. Symptoms of the deadly disease are vomiting, diarrhea and bleeding from the ears, nose and other orifices.

Tourists visiting Kenya are advised that they are in no danger of being infected by the virus if they stay in the usual safari destinations and resorts. However, they should wear long-sleeved shirts and pants, and use mosquito repellent.

Feb. 2, 1998

Ongoing Deforestation

Brazil's National Space Research Institute reported that satellite images reveal the country's Amazon rain forest continues to be ravaged at an alarming rate. While deforestation has declined since the peak year of 1995, slash-and-burn farming techniques and logging still cleared an area of 4,888 square miles during 1997. Some environmental groups say the 20 percent decline in deforestation during the past two years is due to heavy rains that interfered with the burning and logging. The government attributes the decline to their environmental policies, and says that further protection is being hampered by legal complications, inadequate funding and problems in analyzing data.

Renewed Blazes

Hundreds of new fires broke out across parts of Indonesia, rekindling fears that the smoky haze that blanketed much of Southeast Asia last year may return. The most recent fires started in the province of East Kalimantan due to the continuing drought. The extended dry spell affecting the country is expected to continue until June because of shifts in weather patterns caused by the El Niño ocean-warming phenomenon.

Back From Extinction

A huge colony of an Australian wallaby thought to be extinct for most of this century was discovered on an island off the coast of New Zealand's North Island. A colony of 2,000 wallabies, known locally as damas, were positively identified as descendants of Australia's lost tammar wallaby by using genetic marking techniques. A massive cull of the animals in Australia during the 1920s wiped out the marsupials in their native habitat, but a few that had been transplanted to Kawau Island in the late 1800s by a former governor of South Australia thrived in the isolated environment. Australian wildlife authorities are exploring the possibility of bringing the tammar home.

Feb. 16, 1998

El Niño Upside

It's hard to find any good news resulting from El Niño, but some of the rains that have fallen in Africa due to the phenomenon are helping to replenish wildlife in the skies and lakes of Kenya. The number of flamingoes migrating to waters of Lake Nakuru in the Rift Valley dwindled during recent years. But this season's heavy rains have filled the alkali lake to the brim, and 1.5 million flamingoes have returned to feed in its warm, brackish waters.

Mammals have also benefited from the abundance of food created by the rains. Sleek, well-fed lions can be seen resting in the low-slung branches of acacia trees near the banks of Nakuru, watching their playful cubs romp in the long grass below.

Additional Sources: Australian Bureau of Meteorology, U.S. Climate Analysis Center, U.S. Earthquake Information Center and the World Meteorological Organization.

El Niño Update

As El Niño storms continue to strike several areas of the world, the extent of the damage and death toll in the two hardest hit countries are just now becoming apparent.

Mudslides and flooding triggered by El Niño in Peru and Ecuador since mid-December have killed at least 300 people and left more than a quarter of a million others homeless. Those figures are double the number of deaths and destruction that occurred during the previous record El Niño in 1982-83.

In Venezuela, El Niño produced a record heat wave in the normally temperate capital of Caracas where the temperature soared to 91 degrees Fahrenheit. Neighboring Colombia is in the midst of a drought due to the ocean-warming phenomenon. The dry spell may cause a drop in production for the country's key coffee export crop.

Mar. 2, 1998

El Niño's Other Victims

For the starving sea lion pups abandoned by their mothers along Chile's central coast, El Niño's warm currents are only the first part of their ordeal to survive. Shifting fish migration patterns caused by El Niño have sent the pups' mothers to colder waters in search of food. The remaining offspring, cold from their lack of blubber, are turning to Chile's beaches in search of warmth and rest. The lucky ones have been found by Jose Luis Brito and about two dozen volunteers from the port of San Antonio who are helping to nurse the marine mammals back to health. Others are encountering the wrath of angry fishermen who are in competition with the seals for their livelihood. "If I had a stick of dynamite, I'd blow them up," said one fisherman near San Antonio after he booted away one of the emaciated sea lions that had been begging for food at his feet.

El Niño's Wrath

The worst outbreak of tornadoes in Florida history left a corridor of death and destruction through the heart of the Sunshine State. At least 39 people perished in the whirlwinds that left 400 homes in ruins and more than 1,300 others seriously damaged. Florida normally receives only minor tornadoes due to the lack of atmospheric factors responsible for the severe storms in "Tornado Alley" of the American Midwest. However, the current El Niño, dubbed the "climate event of the century," strengthened the subtropical jet stream across Florida, providing the fuel for the record tornado swarm.

Southern Cyclone

Weak tropical cyclone May formed briefly over the Gulf of Carpentaria before losing force upon making landfall on the Australian mainland.

When the Cat's Away

Rats have begun to cause widespread crop destruction across Vietnam because farmers and villagers are eating cats, owls and other predators that normally keep the vermin under control. In its first effort to control the rat problem, Hanoi closed down restaurants serving cat meat to stop a wave of cat-napping that has left the rodents free to devour the country's rice and cereal crops. Domestic cats have been disappearing at an alarming rate in recent years since new specialty establishments began selling the "little tiger" dishes. Nearly 200,000 acres of crops have been destroyed by the exploding rodent population so far this season, and residents are urged to catch and kill the rats by hand because it is safer for the environment than using rat poison.

Hot Side of El Niño

Central America sweltered under some of the hottest winter temperatures in 50 years due to the El Niño's atmospheric disruptions. February readings in northern Nicaragua registered 23 degrees Fahrenheit above normal, and Costa Ricans were roasted by a record temperature of 101 degrees. Unprecedented temperatures reaching 104 degrees in Honduras killed an estimated 200,000 chickens at a farm in the north of the country.

Borneo Blazes

Bush fires burning on the Indonesian side of Borneo showed no sign of abating, with government officials saying they have detected 250 new "hot spots" so far this year. Kalimantan province has been the worst hit since fires were re-ignited by illegal slash-and-burn land-clearing operations.

May 11, 1998

El Niño Pest Invasion

El Niño is being blamed for yet another startling effect on the environment — an invasion of rats and insects in Southern California. The Los Angeles County Department of Health told reporters that the heavy rains caused by the phenomenon have produced more vegetation, which has lured a large number of pests into the region. It is believed that the population of rodents will soar during the summer months, and be accompanied by swarms of mosquitoes. The rains could also speed up the northward migration of the so-called "killer bees" that have spread from South and Central America to the U.S. border in recent years. The Africanized honey bees are being attracted to the region because El Niño rains have caused the desert to bloom.

Norwegian Whale Hunt

Norway has authorized another season of whale hunting in the North Sea in defiance of a worldwide ban on commercial whaling. The country resumed the hunting of minke whales in 1993 after a six-year self-imposed moratorium. The government says it will allow the killing of 671 whales this season, an increase of 30 percent over last year. While there is an official ban on the export of whale products, a thriving black market exists, mainly to Japan. Several Norwegian manufacturers are drawing up plans to resume rendering the blubber for use in lubricants, cosmetics and soaps.

California Twisters

Two days of severe thunderstorms rumbling across both northern and southern parts of California produced strings of tornadoes that caused localized damage. Scores of homes were damaged from one twister in the Silicon Valley, south of San Francisco.

El Niño vs. money

'The Child' is already raising prices

ASSOCIATED PRESS

Demand is rising for wheat, coffee and even roof repairs as forecasts for this year's resurgence of El Niño bring dire predictions of storms, starvation and drought.

The phenomenon that turns up in the tropical Pacific every three to five years can affect weather patterns around the world.

Climatologists warn that this year's incarnation of El Niño, named after the Christ Child 200 years ago by Peruvians who noticed the ocean warming around Christmas, could be the most intense in 150 years.

In Papua New Guinea, more than 1 million people face starvation from the worst drought in 50 years, emergency services officials estimate.

Drought also has affected parts of North Korea, China and Australia. In New Zealand, crop and livestock losses have exceeded $130 million, government farming adviser Chris Ward said. Flooding and unusually warm temperatures have also hit parts of Europe.

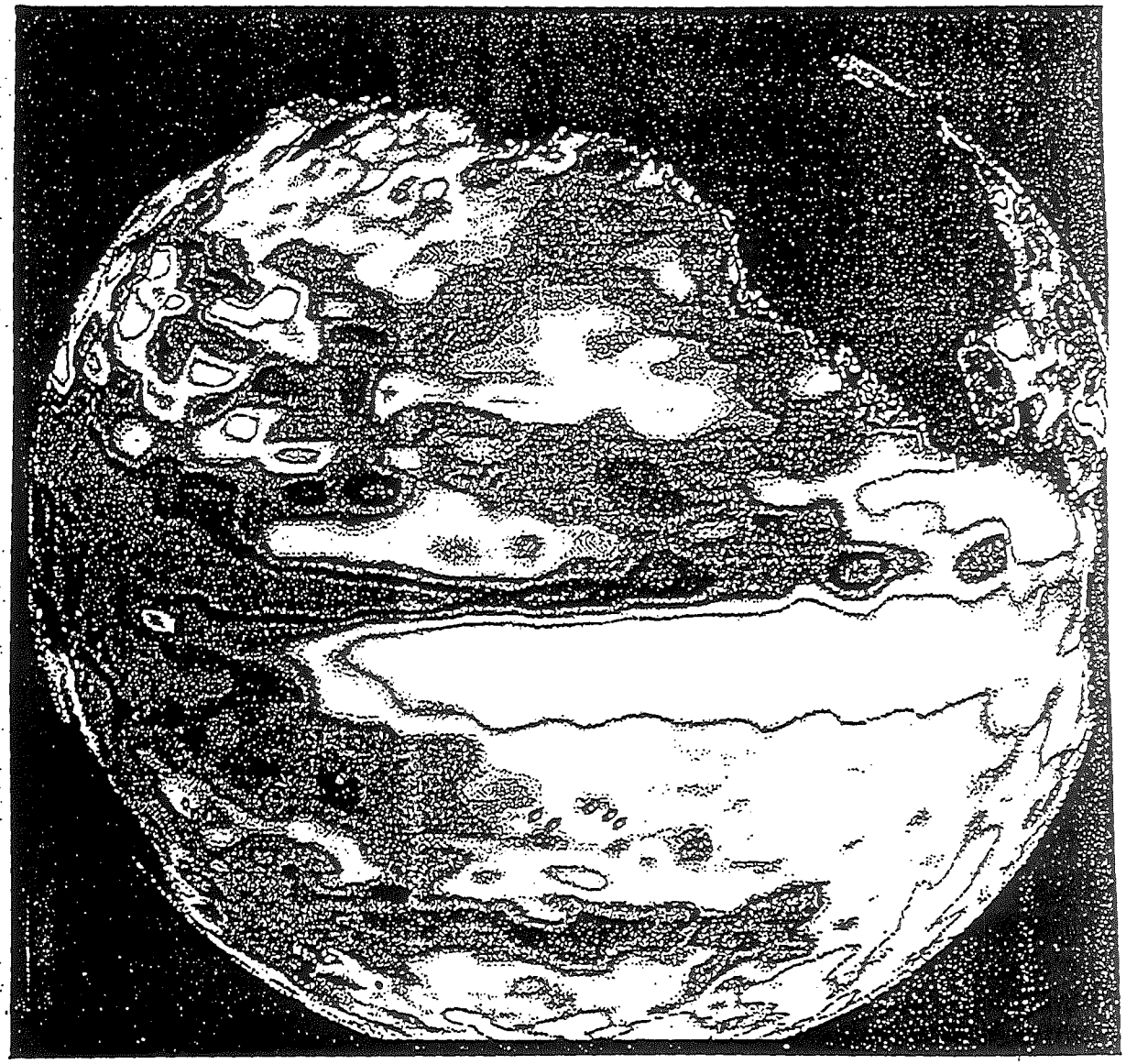
"It might as well be called 'El Diablo' for the toll it takes on the world," said Don Roose, president of U.S. Commodities Inc., who has been following the devilish weather trend for its effects on world crop production.

"The world is very nervous about it," Roose said.

Climatologists expect it to be much stronger than the 1982-83 El Niño, which left an estimated 2,000 people dead and $13 billion in damages around the world, according to the World Meteorological Organization. The phenomenon should reach its peak around November.

Futures prices for foods such as corn, soybeans and wheat usually retreat as harvesting gets under way. But this year, they have remained relatively steady, as investors wait to see if El Niño radically affects demand.

Coffee futures prices also have remained relatively strong, despite rising world inventories.



ASSOCIATED PRI

This image taken from the Jet Propulsion Laboratory's Internet site on Sept. 5, provides convincin information that the weather-disrupting phenomenon El Niño is back and getting stronger. Th red-and-white area indicates a large mass of warm water which has grown to 1½ times the size o the continental United States.

Source: San Antonio Express News

Mega-Cities: They're Here

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Description:
In this lesson students will be introduced to the concept of mega-cities as they locate the 25 largest cities in the world today (1998) and begin to identify and examine issues associated with cities of size. Using a problem solving model, students will analyze data pertaining to large cities, select a problem to focus on, and complete the problem solving process by suggesting their best solution to a significant problem facing mega-cities.

Grade Level:
High School World Geography

Learning Outcomes:
As students proceed through and complete this lesson, they will be able to:
1. Locate selected cities on a desk and wall world map;
2. Identify the political regions of the cities;
3. Identify problems that are common in very large cities (10M or more);
4. Categorize the problems identified as social, political, economic, etc.;
5. Use the problem solving process to examine one significant problem of a selected mega-city;
6. Present the significant problem of the mega-city and its solution to the class;
7. Ask and answer pertinent geographic questions about the mega-cities; and
8. Examine trends on population growth as a means of predicting which cities will become mega-cities in the near future.

Texas Essential Knowledge and Skills (TEKS): World Geography Studies
6A Locate settlements and observe patterns in size and distribution of cities using maps, graphics, and other information;
6B Explain the processes that have caused cities to grow...;
7A ...Use data, graphics, and maps to describe the population characteristics of different societies and to predict future growth trends;
7B Explain the political, economic, social and environmental factors that contribute to human migration...;
7D Develop and defend hypotheses on likely population patterns for the future;
8B Compare ways that humans depend on, adapt to, and modify the physical environment using local, state, national, and international human activities in a variety of cultural and technological contexts;
8D Analyze statistical and other data to infer the effects of physical and human processes on patterns of settlement, population distribution, economic and political conditions,

and resource distribution;
9B Identify the differences among formal, functional, and perceptual regions;
12B Analyze how the creation and distribution of resources affect the location and patterns of movement of products, capital, and people;
13A Prepare maps that illustrate a variety of political entities...;
15C Compare different points of view on geographic issues;
18A Describe the impact of general processes, such as migration...on cultural change;
21A Use historical, geographic, and statistical information from a variety of sources... to answer geographic questions and infer geographic relationships;
21C Construct and interpret maps to answer geographic questions, infer geographic relationships, and analyze geographic change;
22C Use geographic terminology correctly;
22D Use standard grammar, spelling, sentence structure, and punctuation
23C Use a problem solving process to identify a problem, gather information, list and consider options, consider advantages an disadvantages, choose and implement a solution, and evaluate the effectiveness of the solution.

Connections to National Geography Standards:
The World in Spatial Terms: Using maps, tools and technologies to observe and analyze the world
Human Systems: How humans have organized space to satisfy needs
Environment and Society: The impact of human activity on the physical environment and how physical systems affect humans
The Uses of Geography: An understanding of how geography can contribute to a higher quality of life

Fundamental Themes:
Location
Human and Environmental Relationships
Movement

Time Allotment:
Two class periods

Materials Needed:
Pictures of the 25 large cities in the Photo List
Desk Maps
Wall Map of the World
Avery Dots
Chart Paper/Markers
Sentence Strip Paper (or similar sized paper)
Activity Sheet "Mega-Cities: They're Here!"
Transparency of Activity Sheet
Transparency of Cities/Population/Location Table
Transparency of Categories List

Blank Transparency for Webbing

Procedures:

1. Distribute a picture representing a mega-city in the world to each student. (Each city photo should be numbered on back with a number corresponding with the Population Chart.
2. Have students observe details in the picture and try to determine which city is represented. Ask several students to volunteer their answers and tell why they think it is that city.
3. Ask students to tell you what the cities have in common. (All are very large; 10M+)
4. Place the word "mega-city" on the overhead or chalkboard and define it.
5. Distribute desk maps of the world. Place the coordinates transparency on the overhead and have students find their mega-city in the list by number. (The coordinates number in the list is the same number as the number on the back of the picture.) Have students locate their city on their desk map and mark it.
6. Have students mark their city on the wall map. Call each city location by number (1-25) and ask students to name their city as they go to the wall map and place an Avery dot on the location. All other students will place a mark on their desk map as each student posts the Avery dot. Have students write the names of all cities on the back of their desk map as they are announced and marked on the wall map. Give the population of each city as the students are posting the Avery dots. Beside the names of the cities (on the back of the desk maps) students should write the population.
7. As the dots are being posted, tell students to begin thinking about what they are seeing develop as population patterns.
8. After all dots are posted, ask students to make statements about what they see.
9. Ask students to think about geographic questions they might ask based on the pattern of the mega-city distribution. List the questions on sentence strips or other large paper and post around the room.
10. Have students examine their pictures again. This time they should think about possible problems large cities experience.
11. Place the word "mega-cities" in the center of a web or mapping graphic organizer. Solicit possible problems from the students. NOTE: As students offer problems for the web, geographic questions may be posed. Add these to the postings around the room.
As students begin to slow down on problems for the web, show a transparency of major categories into which the problems fall. Have them determine if they have overlooked some problems. Add any new suggestions to the web. Look at the web and have students indicate what category each of the problems listed would fit.
12. Tell students they will be working in pairs to decide on a significant problem of one of the cities between them. For example, if two students have London and Cairo, they will decide between them which city to use for their problem solving exercise.
13. Distribute the activity sheet titled "Mega-cities: They're Here!" Use a transparency of the activity sheet to explain what students are to do. Allow up to 30 minutes for the students to complete their work. Be sure to monitor their work and to assist when needed.
14. Have students record the following items from their activity sheet on a piece of chart paper: #1, #2, #4, #6. The teams of two will present their information to the class. After each presentation, post the chart paper around the room.

15. After all groups have reported, have the students look at the posted charts for similarities in their thinking. How many problems identified as significant were the same? What generalization could be stated about the similar problems? How confident do the students feel about their problem identification? What role will geographers play in helping solve some of the problems associated with mega-cities? What are some other cities that will need to be added to the list in the next 25 years? Which population trends lead you to these cities?

Evaluation:

Students will be assessed informally through observation of their ability to locate cities on their desk map and the wall map and their active participation in the group work. Students will receive a grade on their individual activity sheets based on the degree of accuracy of their responses, i.e., Were they able to use the problem solving process as it was designed?

Mega-cities: They're Here!

City: **Location:**_____
Country/Region

Population:

---

1. Most significant problem:

2. Possible solutions | Advantages | Disadvantages
   1.

   2.

   3.

3. Criteria to measure effectiveness of solutions: Ask these questions about each of the solutions to help decide which to select.
   A. Which solution will have the most long term effect?
   B. Which solution can be implemented with the least amount of resistance and interruption in people's lives?
   C. Which solution will have a positive effect on the largest number of people?

4. Best solution:

5. Implementation Procedures. What steps would need to be followed to implement the best solution?

6. Evaluate the solution's effects. What are some possible results or consequences of the solution chosen?

7. What additional information about mega-cities would you like to have?

CITY	POPULATION	LOCATION
1. Tokyo, Japan		35°N 140°E
2. Mexico City, Mexico		19°N 99°W
3. New York, USA		40°N 73°W
4. Sao Paulo, Brazil		23°S 46°W
5. Osaka, Japan		34°N 135°E
6. Seoul, South Korea		37°N 127°E
7. Cairo, Egypt		30°N 31°E
8. Los Angeles, USA		34°N 118°
9. Moscow, Russia		57°N 37°E
10. Buenos Aires, Argentina		34°S 58°W
11. Bombay (Mumbai), India		18°N 72°E
12. London, England		51°N 0°W
13. Calcutta, India		22°N 88°E
14. Jakarta, Indonesia		6°S 106°E
15. Paris, France		48°N 2°E
16. Beijing, China		39°N 116°E
17. New Delhi, India		28°N 77°E
18. Tehran, Iran		35°N 51°E
19. Shanghai, China		31°N 121°E
20. Dhaka, Bangladesh		35°N 90°E
21. Chicago, USA		41°N 87°W
22. Manila, Philippines		14°N 121°E
23. Bangkok, Thailand		13°N 100°E
24.Bogota, Columbia		4°N 74°W
25. Karachi, Pakistan		24°N 68°N

CITY	POPULATION	LOCATION
1. Tokyo, Japan	30.3 M	35°N 140°E
2. Mexico City, Mexico	24 M	19°N 99°W
3. New York, USA	18.5 M	40°N 73°W
4. Sao Paulo, Brazil	16.9M	23°S 46°W
5. Osaka, Japan	16.9M	34°N 135°E
6. Seoul, South Korea	15.8M	37°N 127°E
7. Cairo, Egypt	15 M	30°N 31°E
8. Los Angeles, USA	14.5 M	34°N 118°
9. Moscow, Russia	13.1 M	57°N 37°E
10. Buenos Aires, Argentina	13 M	34°S 58°W
11. Bombay (Mumbai), India	12.5 M	18°N 72°E
12. London, England	11.1 M	51°N 0°W
13. Calcutta, India	11 M	22°N 88°E
14. Jakarta, Indonesia	10.2 M	6°S 106°E
15. Paris, France	10.2 M	48°N 2°E
16. Beijing, China	9.9 M	39°N 116°E
17. New Delhi, India	9.5 M	28°N 77°E
18. Tehran, Iran	9.5 M	35°N 51°E
19. Shanghai, China	9.3 M	31°N 121°E
20. Dhaka, Bangladesh	9 M	35°N 90°E
21. Chicago, USA	8 M	41°N 87°W
22. Manila, Philippines	7.5 M	14°N 121°E
23. Bangkok, Thailand	7 M	13°N 100°E
24. Bogota, Columbia	6.1 M	4°N 74°W
25.Karachi, Pakistan	5.3 M	24°N 68°N

Categories List

1. Economic

2. Health
   - Physical
   - Mental

3. Recreation/Leisure Time

4. Government/Governance

5. Environment

6. Aesthetics

7. Social Relationships

8. Transportation

9. Communication

10. Defense

11. Education

12. Law/Crime

13. Housing/Shelter

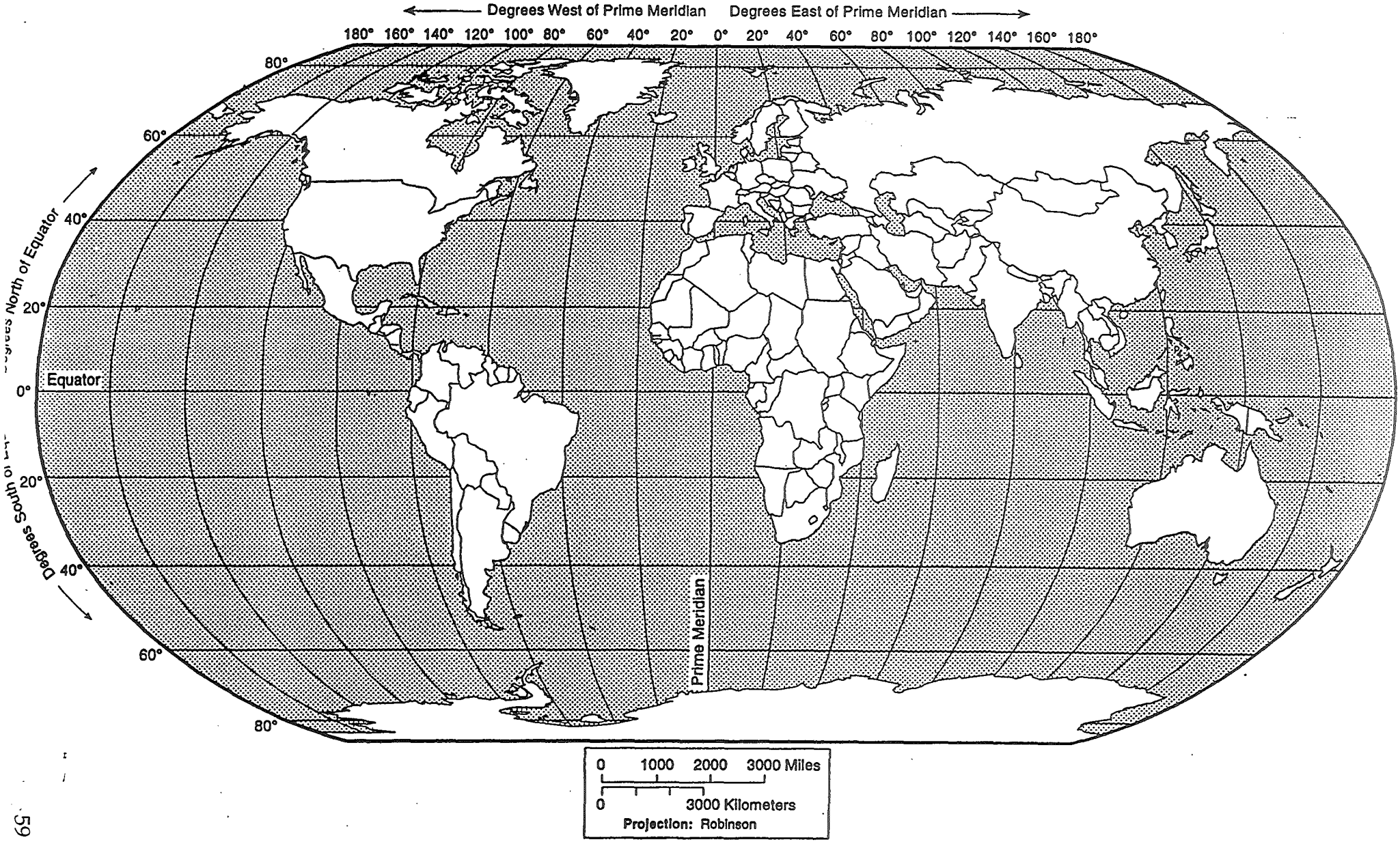
14. Civility/Social Mores

15. Infrastructure

Photo List

1. Tokyo (Ginza)
2. Mexico City
3. New York (Under the city)
4. Sao Paulo
5. Osaka
6. Seoul
7. Cairo
8. Los Angeles
9. Moscow
10. Buenos Aires
11. Bombay(Chow Patty Beach)
12. London
13. Calcutta
14. Jakarta
15. Paris
16. Beijing
17. New Delhi
18. Tehran
19. Shanghai
20. Dhaka
21. Chicago
22. Manila
23. Bangkok
24. Bogota
25. Karachi

World



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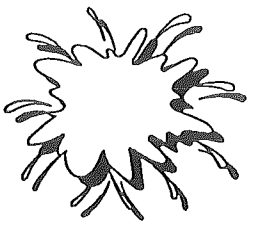
ARIZONA GEOGRAPHIC ALLIANCE

A Fight Over Liquid Gold



Name:
Rowena Ortega, Rockdale High School, 1205 Murray, Rockdale, TX 76567
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Description:
This lesson will explore and analyze water rights/usage of the Colorado River in the western United States and relate it to the Five Themes of Geography. Note: This can be used in covering water issues of the world or regional areas of study.

Grade Level:
High School (9-12)

Purpose:
This is a lesson on water usage/rights as it relates to population growth especially in marginal areas.

Essential Elements (TEKS):
2A describe the human and physical characteristics of the same place at different periods of history
3B describe physical environments of regions and the physical processes that affect these regions
5A analyze how the character of a place is related to its political , economic, social, and cultural characteristics
6B explain the processes that have caused areas to grow such as location, availability of resources, economic activities, and continued access to other cities and resources.
7B explain the political, economic, social, and environmental factors that contribute to human migration and how physical geography affects migration.
8A explain the interrelationships among physical and human processes that shape geographic characteristics of places.
8B compare ways that humans depend on, adapt, and modify the physical environment
8D analyze statistical and other data to infer the effects of physical and human processes on patterns of population.
15(A-C) The student understands how different points of view influence the development of public policies and decision-making processes on local, state, national, and international levels.
19 (A-B) The student understands the impact of technology and human modifications on the physical environment.
20B analyze the role of technology in agriculture and other primary economic activities and identify the environmental consequences of the changes that have taken place.
21A use historical, geographic, and statistical information from a variety of sources to answer geographic questions and infer geographic relationships.
22A design and draw appropriate maps and other graphics to present geographic information
23A Plan, organize, and complete a group research project that involves asking geographic questions; acquiring organizing, and analyzing geographic information; answering geographic questions; and communicating results.
23B use case studies and geographic information systems to identify contemporary geographic problems and issues and to apply geographic knowledge and skills to answer real world questions.
23C use a problem-solving process to identify a problem, gather information, list and consider options, consider advantages and disadvantages...

Connection to National Geography Standards:

1 How to use maps and other geographic representations, tools, and technologies
4 The physical and human characteristics of places
5 That people create regions to interpret Earth's complexity
9 The characteristics, distribution, and migration of human population on Earth's surface
13 How the forces of cooperation and conflict among people influence the division and control on Earth's surface
14 How human actions modify the physical environment
15 How physical systems affect human systems
16 The changes that occur in the meaning, use, distribution, and importance of resources
18 How to apply geography to interpret the present and plan for the future

Fundamental Themes:

Location
Place
Human/Environment Interactions
Movement
Region

Objectives:

Students will be able to:

1.. Understand the treaty and laws surrounding use of the Colorado river.
2. Examine the water usage using the Five Geographical Themes
3. Investigate water usage/rights as it pertains to different interest groups

Procedures:

1. Background Discussion Conduct a teacher directed discussion that includes background information on the Colorado river, the Treaty and Water Compact. Use information included in packet including the three diagrams that show estimates of water use in the Western U.S., Projected population sizes of western states, and drought management plans.
2. Group Activity Part 1: The Five Themes Presentations
   Divide the class into groups.
   A. Each group should first read the article entitled "A Fight Over Liquid Gold". (Optional: You may have the students answer guided reading questions to ensure an understanding of the information in the article.)
   B. Give each group the instructions for the Group Activity Part 1., markers, and a piece of butcher paper to do their presentation on. (Alternate ideas: overhead transparency, poster board)
   C. Have each group present their Five Themes and discuss similarities and differences in each group's perceptions.
3. Group Activity Part 2: Interest Groups
   A. Hand out the instruction sheets for part 2.
   B. They should brainstorm and write down their arguments on notebook paper, butcher paper, transparency, etc.
   C. Have each group present their arguments in support of their interest groups.
   D. Have the students return to their groups and develop arguments against the other interest groups as to why they should not be entitled to as much water.
   E. Discuss results either informally or in debate format.

4. Optional: "Here I Stand"

If desired have each student write their own individual opinion on the issue of usage/rights of the Colorado River. It should include reasons as to why they feel the way they do and cite concrete examples from the presentations and discussions.

Classroom Time:

2-3 class periods (50-55 minutes long)

Evaluation (Assessment):

1. Participation in discussion and activities.
2. Correct use of the Five Themes of Geography
3. "Here I Stand " paper
4. A rubric can be used as well as Presentation Brag Sheets where the students will grade themselves and their group members.

Extensions:

1. Video - "The Colorado River" (NOVA)
2. Can be used in conjunction with other water issues from around the world.

Materials:

1. Handouts included on the Colorado River and the Treaty and Water Compact.
2. Butcher paper, overhead transparency, or poster board
3. Markers
4. Textbook or Atlas
5. Group instruction sheets

Resources

"A Fight Over Liquid Gold", Time July 22, 1991
Colorado River - http://crwua.mwd.dst.ca.us/tcr/crwa_tcr.htm
Colorado River Decision Support System-http://cando.dwr.co.gov/overview/bigoverview/crdsscov.htm
Government Documents: Report to the Western Water Policy Review Advisory Commission
Alward, Gregory and Pamela Case, Patterns of Demographic, Economic and Value Change in the Western United States
Solley, Wayne B., Estimates of Water Use in the Western United States
Wilhite, Donald, Improving Drought Management in the West
Holmes, Sue Major, "Growth, Indians, endangered fish vie for Colorado River Compact water", http://tlc.wtp.net/growth.htm
The Law of the River - http://crwua.mwd.dst.ca.us/lor/crwua_lor.htm
Wullenjohn, Chuck, "Quechan Indians boast long Colorado river history", http://www.yuma.army.mil/public-affairs/quechan.html

GROUP ACTIVITY PART 1:
"A FIGHT OVER LIQUID GOLD"

Instructions: As a group read the article "A Fight Over Liquid Gold". Organize a presentation to the rest of the class using the Five Themes of Geography. Your presentation will be written on butcher paper. Follow the directions carefully.

1. Write the name of each theme. Write the supporting information from the articles and/or diagrams next to/under each theme.
2. Use words and diagrams, pictures, maps, etc. to illustrate the themes.
3. Use the article, handouts, an atlas, textbook, the teacher, etc. to help you
4. Develop your themes

LOCATION - Draw a map of the area involved and label physical cultural and political items. Your map should show both Absolute and Relative location.

PLACE - Identify physical and human characteristics of the area involved.

HUMAN/ENVIRONMENT INTERACTIONS - Identify ways that people and the environment are interacting with each other.

MOVEMENT - Identify as many parts of the theme as possible. Include aspects of trade, cultural diffusion, migration, and infrastructure.

REGIONS - (maps can work here too) Identify at least two of the following types of regions - Physical, Cultural, Political, Economic.

GROUP ACTIVITY PART 1:
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GROUP ACTIVITY PART 2:
INTEREST GROUPS

YOUR INTEREST GROUP - Environmentalists/ Conservationists

Your group is concerned about destruction of the ecosystem, air/water pollution, depletion of the river, encroachment of civilization.

Your group will take the viewpoint of an interest group that is concerned about its rights to the Colorado River. If a new Water Rights Compact is written, how the water will be allocated this time will be a major question.

On a second sheet of butcher paper

1. Write the name of your interest group at the top.
2. List as many arguments as you can think of that explain why your group deserves a share of the Colorado river.
3. Include an estimate of how much water you should get and back it up with concrete reasons.

GROUP ACTIVITY PART 2:
INTEREST GROUPS

YOUR INTEREST GROUP - Recreationists

Your group includes campers, hikers, rafters, boaters, and also visitors to cities such as Las Vegas which needs water for hydroelectricity and water for the golf courses.

Your group will take the viewpoint of an interest group that is concerned about its rights to the Colorado River. If a new water rights compact is written how the water will be allocated this time will be a major question.

On a second sheet of butcher paper

1. Write the name of your interest group at the top.
2. List as many arguments as you can think of that explain why your group deserves a share of the Colorado river.
3. Include an estimate of how much water you should get and back it up with concrete reasons.

GROUP ACTIVITY PART 2:
INTEREST GROUPS

YOUR INTEREST GROUP - the Native Americans living in the seven Colorado river basin states

Your group will take the viewpoint of an interest group that is concerned about its rights to the Colorado River. If a new water rights compact is written how the water will be allocated this time will be a major question.

On a second sheet of butcher paper

1. Write the name of your interest group at the top.
2. List as many arguments as you can think of that explain why your group deserves a share of the Colorado river.
3. Include an estimate of how much water you should get and back it up with concrete reasons.

GROUP ACTIVITY PART 2:
INTEREST GROUPS

YOUR INTEREST GROUP - City Water Managers for the Seven Colorado River basin states

Your group will take the viewpoint of an interest group that is concerned about its rights to the Colorado River. If a new water rights compact is written how the water will be allocated this time will be a major question.

On a second sheet of butcher paper

1. Write the name of your interest group at the top.
2. List as many arguments as you can think of that explain why your group deserves a share of the Colorado river.
3. Include an estimate of how much water you should get and back it up with concrete reasons.

GROUP ACTIVITY PART 2:
INTEREST GROUPS

YOUR INTEREST GROUP - Farmers

Your group will take the viewpoint of an interest group that is concerned about its rights to the Colorado River. If a new water rights compact is written how the water will be allocated this time will be a major question.

On a second sheet of butcher paper

1. Write the name of your interest group at the top.
2. List as many arguments as you can think of that explain why your group deserves a share of the Colorado river.
3. Include an estimate of how much water you should get and back it up with concrete reasons.

GROUP ACTIVITY PART 2:
INTEREST GROUPS

YOUR INTEREST GROUP - Government Officials from Mexico

Your group will take the viewpoint of an interest group that is concerned about its rights to the Colorado River. If a new water rights compact is written how the water will be allocated this time will be a major question.

On a second sheet of butcher paper

1. Write the name of your interest group at the top.
2. List as many arguments as you can think of that explain why your group deserves a share of the Colorado river.
3. Include an estimate of how much water you should get and back it up with concrete reasons.

CRITIQUE SHEET - A FIGHT OVER LIQUID GOLD

NAME: _____ DATE: _____ CLASS: _____

	Strong	Moderately Strong	Average	Moderately Weak	Weak
1. The student followed the guidelines given for completing this project.	10	8	6	4	2
2. The project demonstrates the student's knowledge of the Five Themes	10	8	6	4	2
3. The project demonstrates the student's ability to communicate effectively.	10	8	6	4	2
4. The project demonstrates new knowledge that the student has gained as a result of the project.	10	8	6	4	2
5. The information on the Five Themes was complete and clearly illustrated the issue over the Colorado River.	20	15	10	5	1
6. The project is free of grammatical and spelling errors.	5	4	3	2	1
7. The student participated well within his/her group and contributed positively.	10	8	6	4	2
8. The project is neat and easy to read	5	4	3	2	2
9. The student came up with persuasive arguments to support his/her interest group.	10	8	6	4	2
10. The student took an active part in the presentation.	10	8	6	4	2

FINAL GRADE: ____
COMMENTS:

STUDENT BRAG SHEET

NAME: _____ OTHER GROUP MEMBERS: _____
_____

I give myself a _____ because

Things that I did to help my group:

Things that I could have done better:

I give _____ a _____ because

I give _____ a _____ because

I give _____ a _____ because

I give _____ a _____ because

To Industrialize or Not?.....That's the Geographic Question!

Name:
Edward Maneikis, James Bowie High School, 2101 Highbank Drive, Arlington, TX 76018 World Geography, (817)472-4400
Michael Young, Bishop Dunne High School, 3900 Rugged Drive, Dallas, TX 75224 World Geography, (214)339-6561

Description:
This lesson will analyze and demonstrate how geographic variables are all interrelated when discussing the industrialization of countries.

Grade Level:
High School (9-12)

Purpose:
To increase student geographic awareness and proficiency as outlined in Guidelines for Geographic Education. Using "Big Issues" as a concentration for solving regional problems, students will:

1. Initiate Geographic Questions
2. Acquire Geographic Data
3. Organize Geographic Information
4. Analyze Geographic Information
5. Answer Geographic Questions

Essential Elements (TEKS):

5A Analyze how the character of a place is related to its political, economic, social, and cultural characteristics
5B Analyze political, economic, social, and demographic data to determine level of development and standard of living in nations
6A locate settlements and observe patterns in the size and distribution of cities using maps, graphics, and other information
7A Construct and analyze population pyramids and use other data to describe population characteristics of different societies and predict future growth trends
11B Identify factors affecting the location of different types of economic activities
12B Analyze how the creation and distribution of resources affect the location and patters of movement of products, capital, and people
20A Describe the impacts of new technologies, new markets, and revised perceptions of resources
22B Apply appropriate vocabulary, geographic models, generalizations, theories, and skills to present geographic information
22C Use geographic terminology correctly
22D Use standard grammar, spelling, sentence structure, and punctuation

23A Plans, organizes, and completes group research project using geographic data

Connection to National Geography Standards:
1. maps and other geographic tools for information in a spatial perspective
3. spatial organization of earth
7. physical processes that shape earth's surface
9. characteristics, distribution, and migration of human populations
11. patterns and networks of economic interdependence
13. forces of cooperation and conflict among people influence division and control
15. physical systems affect human systems
16. meaning, use, distribution, and importance of resources
18. apply geography to interpret the present and plan for the future

Fundamental Themes:
Location
Place
Human/Environment Interaction
Movement
Region

Objectives:
Students will be able to:
1. Use geographic information and tools to understand relationships between a lack of social and economic indicators and industrialization
2. Recognizing requirements for industrialization and deficiencies in Sub-Sahara Africa
3. Analyze possible solutions to industrialization in Sub-Sahara Africa

Procedures: (Based on a 90 minute block period this lesson will take 2-3 class days, Lesson does not have to be done on consecutive class days)
Day 1
1. Brainstorming activity
    a. Write on chalkboard "What does a country need for industrial development to occur?"
    b. Have students write 4-5 factors on sheet of paper individually(5 minutes)
    c. Row by row ask each student what their 4-5 factors are. List them on the board using graphic organizer, make sure not to repeat responses.
2. Making a Human Perspective
    a. Display a picture from each of the 5 countries, illustrating problems within these countries (Teachers may use Transparencies, slide projection, or just magazine pictures)
    b. The idea is to bring out the human geography of Sub-Sahara Africa (The teacher may want to comment on each of the pictures and tell a story of the photographs)

3. Role Play

1. Divide the class in groups of 5, across all academic levels (Teacher may want to assign 1 all girl and 1 all boy group to see any gender differences in the proposal)
2. Once groups have been assigned, pass out map portfolios for their assigned countries. (Sudan, Ethiopia, Democratic Republic of Congo, Nigeria, and Angola),
3. Students should then elect 1 person to be president of the group. Other members will choose among Minister of Education, Minister of Health, Minister of Industry and Agriculture and Minister of National Defense.
4. Teacher will then pass out individual jobs of each minister on index cards which includes the information that that they will provide for group consultation.
5. Class will then go to library or computer lab for research.
6. Using the Internet or other textual resources, the student will be able to research and find data to satisfy the requirement's for their jobs that are listed on the index cards.
7. As research is in progress, the teacher should monitor the student to ensure on task behavior and the access to unauthorized sites.
8. The teacher should devote time to questions and answer to ensure that students are clear about what they are supposed to be accomplishing, and to ensure that students have accessed information to complete the lesson

Day 2

1. Once basic research has been completed the students will go back to the classroom and begin to consult in their groups about the problems in their particular country.
2. Students will be expected to provide possible solutions to the lack of industrialization and what type of industry would work best in their Sub-Saharan country, by analyzing the information found.
3. The teacher can hand out situation cards that throw a wrench, or a bonus in their problem solving, such as drought, civil war, famine, or positives such as an increase in oil prices, a bumper crop, or an end to a conflict.
4. Each group will give a 10-15 minute presentation on their country, with each Minister providing the information from their job duties. The President (group leader) will propose the possible solutions to industrialization concerns.
5. The class will have 2-3 minutes to ask questions about the proposal.
6. After the proposals are completed, discuss the barriers Sub-Saharan Africa has to overcome to be able to industrialize.

Evaluation (Assessment)

A rubric will be provided to each group to ensure accurate assessment.

Extensions

This lesson can be part of any overall Unit focusing on a developing region.

Materials

1. Packets of thematic maps consisting of "Population Density", "Climate", "Vegetation", "Land use", "Natural Resources", and "agricultural exports". Student can also use desk atlas if available.
2. Note cards for the different Ministries and their job duties, and for positive/ negative situations.
3. Information sheet with goals.

Resources

1. Country information provided to the teacher is obtained by accessing the 1997 C. I .A. World Fact Book found at WWW.odci.gov/cia/publications/factbook
2. Pictures provided by World Geographical Encyclopedia, Africa v.1, McGraw-Hill Pub, 1995.
3. Thematic maps provided by Nystrom Desk Atlas, copyright 1994, division of Herff Jones, Inc. 3333 Elston Av Chicago, IL 60618.
4 Computer maps provided by Environmental Systems Research Institute, Redlands, CA, www.esri.com

Student Project Instructions

Congratulations!!! You have been given the responsibility as a governmental Minister in a Sub-Sahara African country. You and the other members of your government will have an important mission of proposing ways to increase industries located in your country. You will be given cards with the names of the 4 ministries and the information that each is expected to find. The education minister is expected to help out the minister of industry and agriculture. You will have to elect a President to deliver the major proposal to the rest of the class when your country makes its presentation.

Each country will present a 10-15 minute presentation encompassing the following:

- visual form demonstrating statistical data of each ministry
- Prioritization of factors influencing industrialization(war, education, starvation)
- Absolute and Relative location of proposed industry
- Proposed industry type best suited for resources/labor market
- Each minister will have to propose improvements to their industry and support it
- Proposal must be ethical and humane

Note: While you are working in your groups, you may receive a special situation card that may be of positive or adverse circumstances. Part of your grade will be how you deal with these situations.

The groups will have to complete a self appraisal of each member in the group.

Proposal and Presentation Rubric

Individual Tasks:

__Each student was assigned an individual task within the group
__Each student has provided his/her required information as Minister of their department
__Each student has presented their information using maps to portray data
__Each student in the their respective fields has proposed a plan for improvements in their areas and supported their findings

Group Tasks:

__The group proposal identified an industry that is suitable for development within their country best suited for its socio-economic, political, and environmental status
__The group presentation has explained why the chosen will be most effective and substantiate it with enough valid geographical support
__Each group has given the absolute and relative locations of the industry they have chosen. Relative location to geographical landmarks, rivers, and transportation
__Group has prioritized factors influencing industrialization (i.e. war, famine, disease) within country and developed a process for which ones must be addressed first, second third, etc.
__Groups were able to handle and deal with situation card and adjust proposal to circumstances

5pts—Meets and exceeds expectations
4pts—Meets all expectations
3pts—Meets some of expectations
2pts—Fails to meet most expectations
1pts—Fails to meet any expectations

___Total points attained/45 Total points possible

MINISTER OF INDUSTRY AND AGRICULTURE

- NATURAL RESOURCES
- GDP
- GNP
- AGRICULTURAL EXPORTS
- ARABLE LAND
- AVAILABLE METHODS OF TRANSPORTATION

MINISTER OF EDUCATION

- Literacy rates
- Average Number of school years per child
- ASSIST MINISTER OF INDUSTRY

MINISTER OF NATIONAL DEFENSE

- SIZE OF MILITARY
- INTERNAL CONFLICTS - (i.e. TRIBAL, RELIGIOUS)
- EXTERNAL CONFLICTS (i.e. BORDERS)

PRESIDENT

- Type of Government
- Kinds of Political Parties
- DATE OF INDEPENDENCE
- NAME OF PRESIDENT

MINISTER OF HEALTH

- INFANT MORTALITY RATE DATA
- LIFE EXPECTANCY DATA
- FERTILITY RATE DATA
- DOCTORS PER POPULATION DATA
- POPULATION GROWTH
  BIRTH RATE - DEATH RATE DATA

Situation Card

Political unrest in your country has ceased

Situation CARD

OPEC INCREASES PRODUCTION PRICES FALL

Situation CARD

A neighboring country has completed a dam that has cut off your nations water supply by 50%

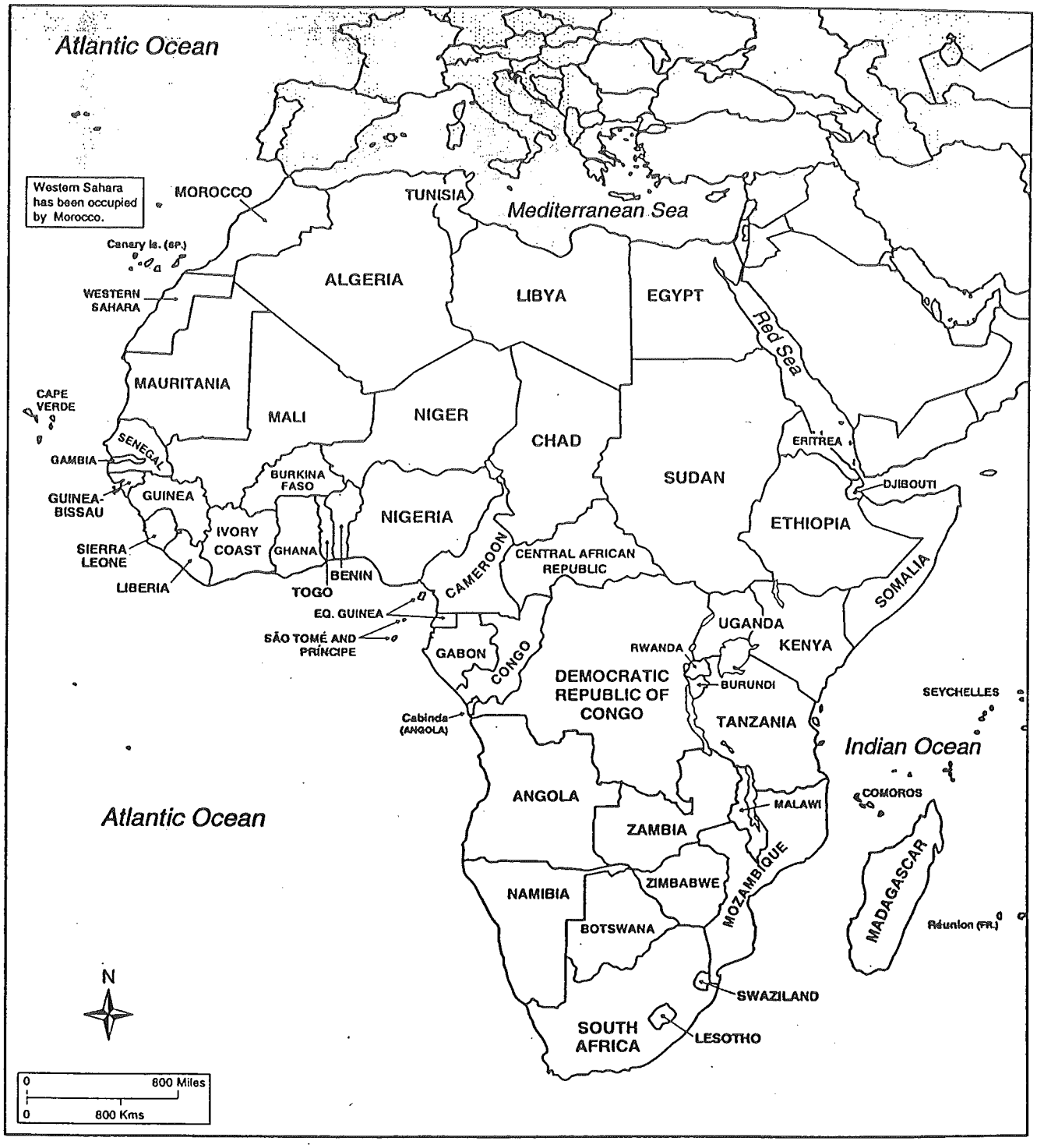
Situation CARD

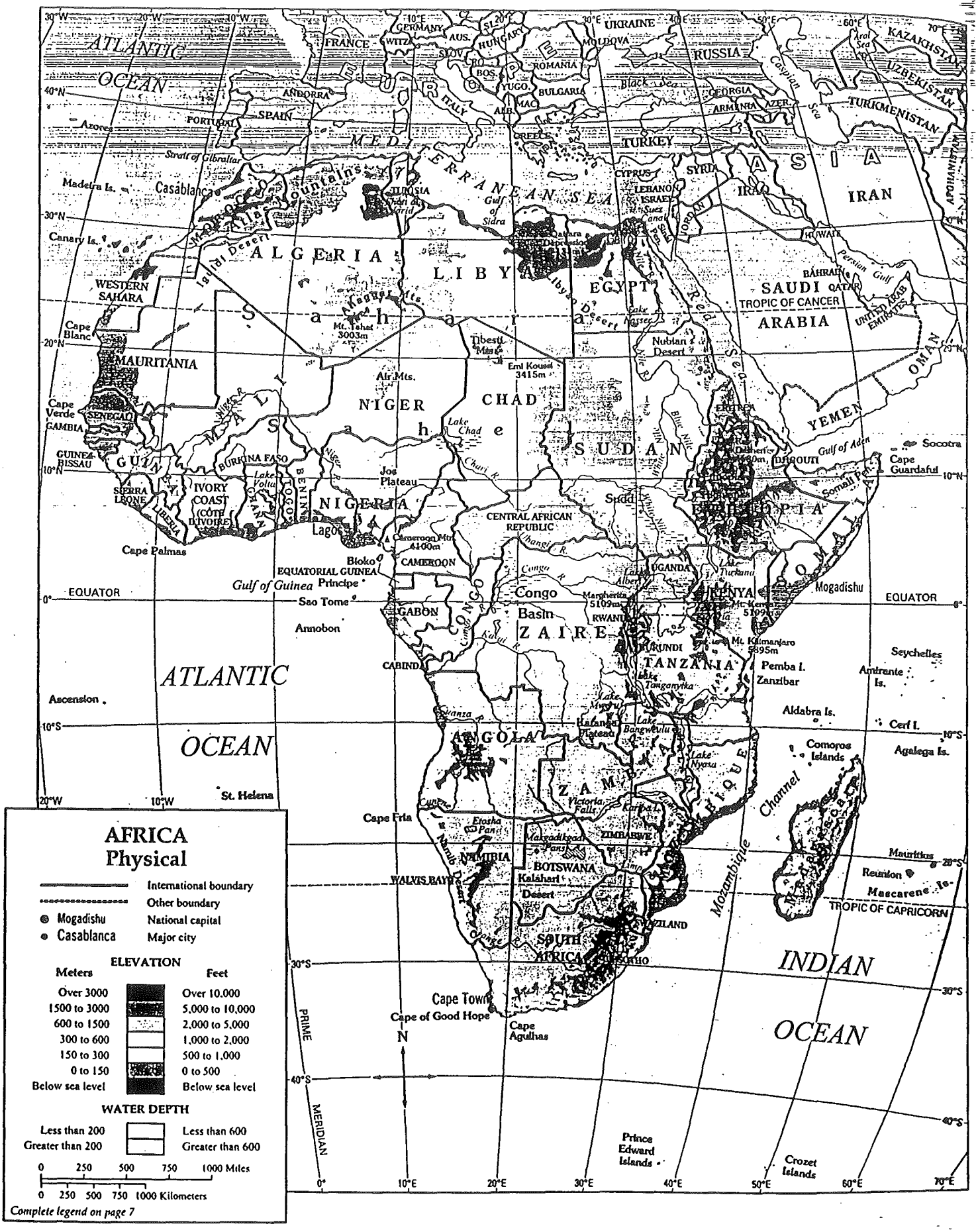
Yield of main Cash Crops increases by 25%

Situation CARD.

A small scale territorial dispute turns into a shoot out. The minister of National Defense is asked to start drafting men for military service

Africa




AFRICA
Physical
International boundary
Other boundary
Mogadishu National capital
Casablanca Major city
ELEVATION
Meters
Feet
Over 3000
Over 10,000
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Below sea level
WATER DEPTH
Less than 200
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0 250 500 750 1000 Kilometers
Complete legend on page 7
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INDIAN OCEAN
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EUROPE
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LIBYA
EGYPT
MOROCCO
WESTERN SAHARA
MAURITANIA
MALI
NIGER
CHAD
SUDAN
NIGERIA
ETHIOPIA
SOMALIA
KENYA
UGANDA
TANZANIA
ZAIRE
ANGOLA
ZAMBIA
MOZAMBIQUE
ZIMBABWE
NAMIBIA
BOTSWANA
SOUTH AFRICA
SWAZILAND
LESOTHO
GUINEA
SENEGAL
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GUINEA BISSAU
SIERRA LEONE
LIBERIA
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GHANA
TOGO
BENIN
CAMEROON
CENTRAL AFRICAN REPUBLIC
CONGO
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RWANDA
BURUNDI
DJIBOUTI
ERITREA
YEMEN
SAUDI ARABIA
OMAN
UNITED ARAB EMIRATES
QATAR
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KUWAIT
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SYRIA
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ISRAEL
JORDAN
CYPRUS
TURKEY
GREECE
BULGARIA
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RUSSIA
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UZBEKISTAN
TURKMENISTAN
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ARMENIA
AZERBAIJAN
Casablanca
Madeira Is.
Canary Is.
Azores
Cape Blanc
Cape Verde
Cape Palmas
Cape Fria
Cape Town
Cape of Good Hope
Cape Agulhas
Cape Guardafui
Socotra
Mogadishu
Lagos
Jos Plateau
Air Mts.
Tibesti Mts.
Ennedi Mts.
Nubian Desert
Libyan Desert
Red Sea
Persian Gulf
Gulf of Aden
Gulf of Guinea
Gulf of Sidra
Strait of Gibraltar
Suez Canal
Aswan High Dam
Lake Nasser
Lake Chad
Lake Volta
Lake Victoria
Lake Tanganyika
Lake Malawi
Lake Albert
Lake Turkana
Lake Kariba
Victoria Falls
Kalahari Desert
Namib Desert
Etosha Pan
Makgadikgadi Pans
Okavango Swamp
Zambezi R.
Congo R.
Niger R.
Nile R.
Orange R.
Limpopo R.
Kafue R.
Chari R.
Benue R.
White Nile
Blue Nile
Mt. Kilimanjaro 5895m
Mt. Kenya 5199m
Mt. Elgon 4321m
Mt. Cameroon 4100m
Mt. Tahat 3003m
Emi Koussi 3415m
Margherita 5109m
Pemba I.
Zanzibar
Seychelles
Amirante Is.
Aldabra Is.
Cerf I.
Agalega Is.
Comoros Islands
Mauritius
Reunion
Mascarene Is.
Prince Edward Islands
Crozet Islands
St. Helena
Ascension
WALVIS BAY
Mozambique Channel
TROPIC OF CANCER
TROPIC OF CAPRICORN
EQUATOR
PRIME MERIDIAN
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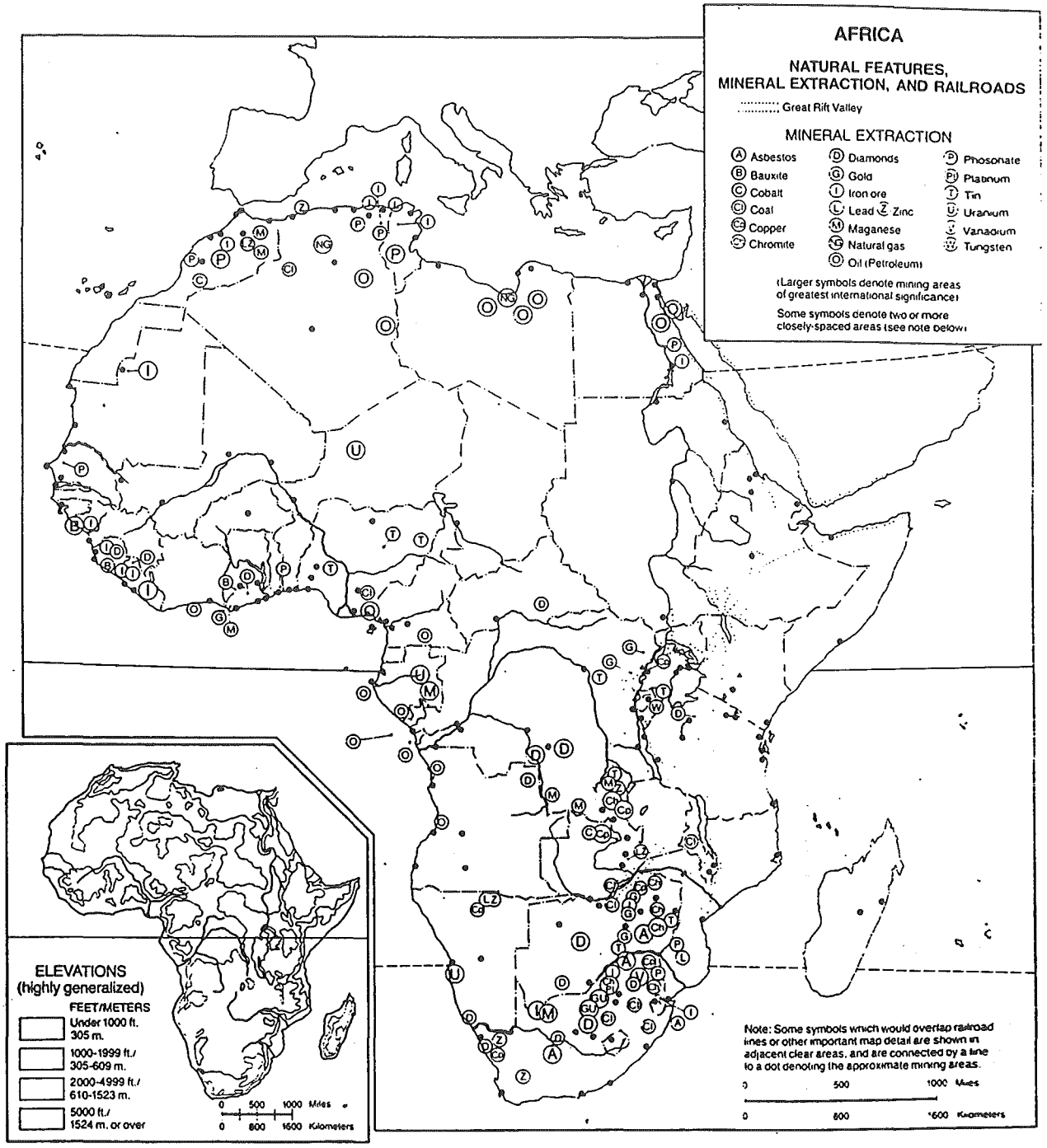
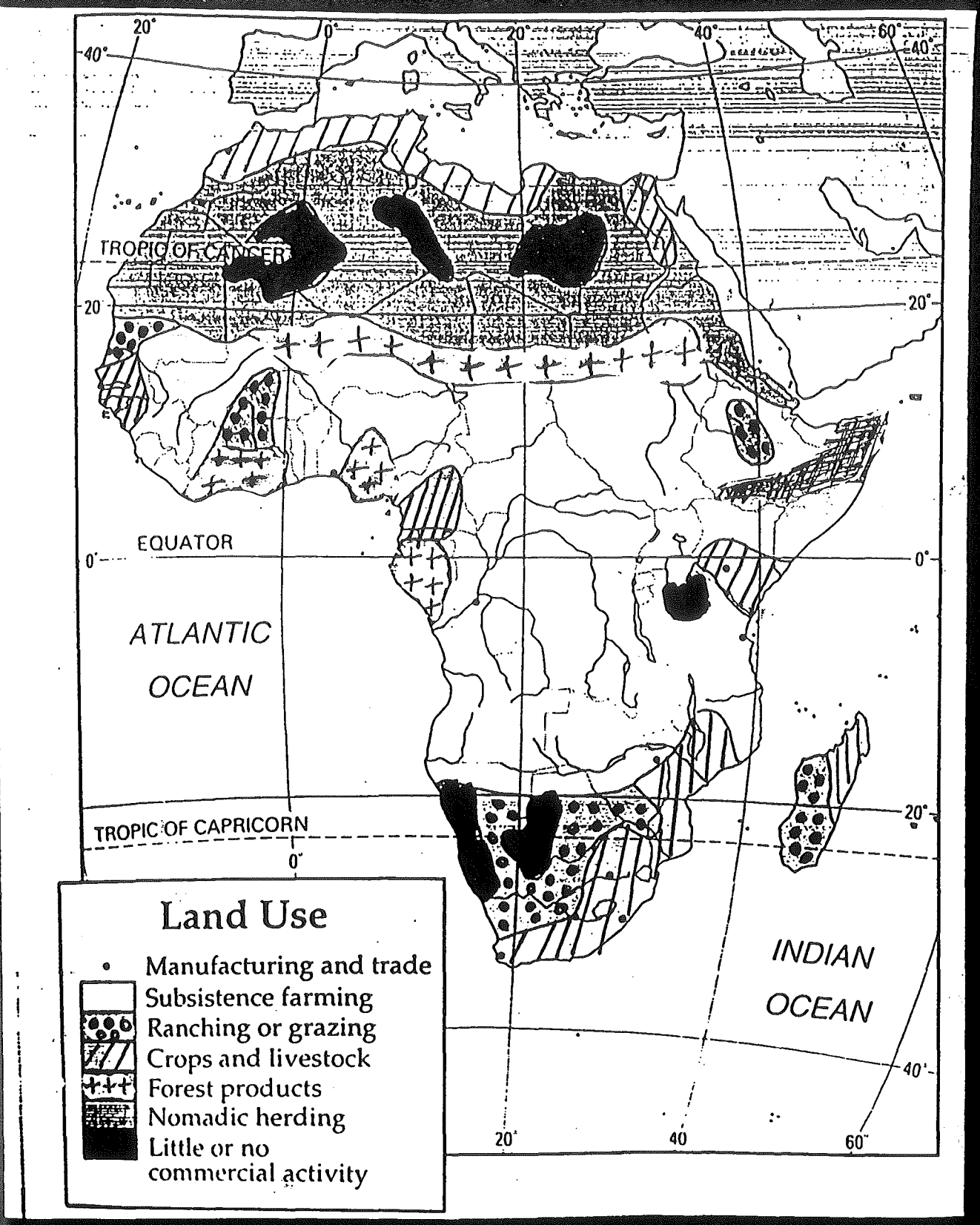
Africa: Natural Features, Mineral Extraction, and Railroads (21.2)

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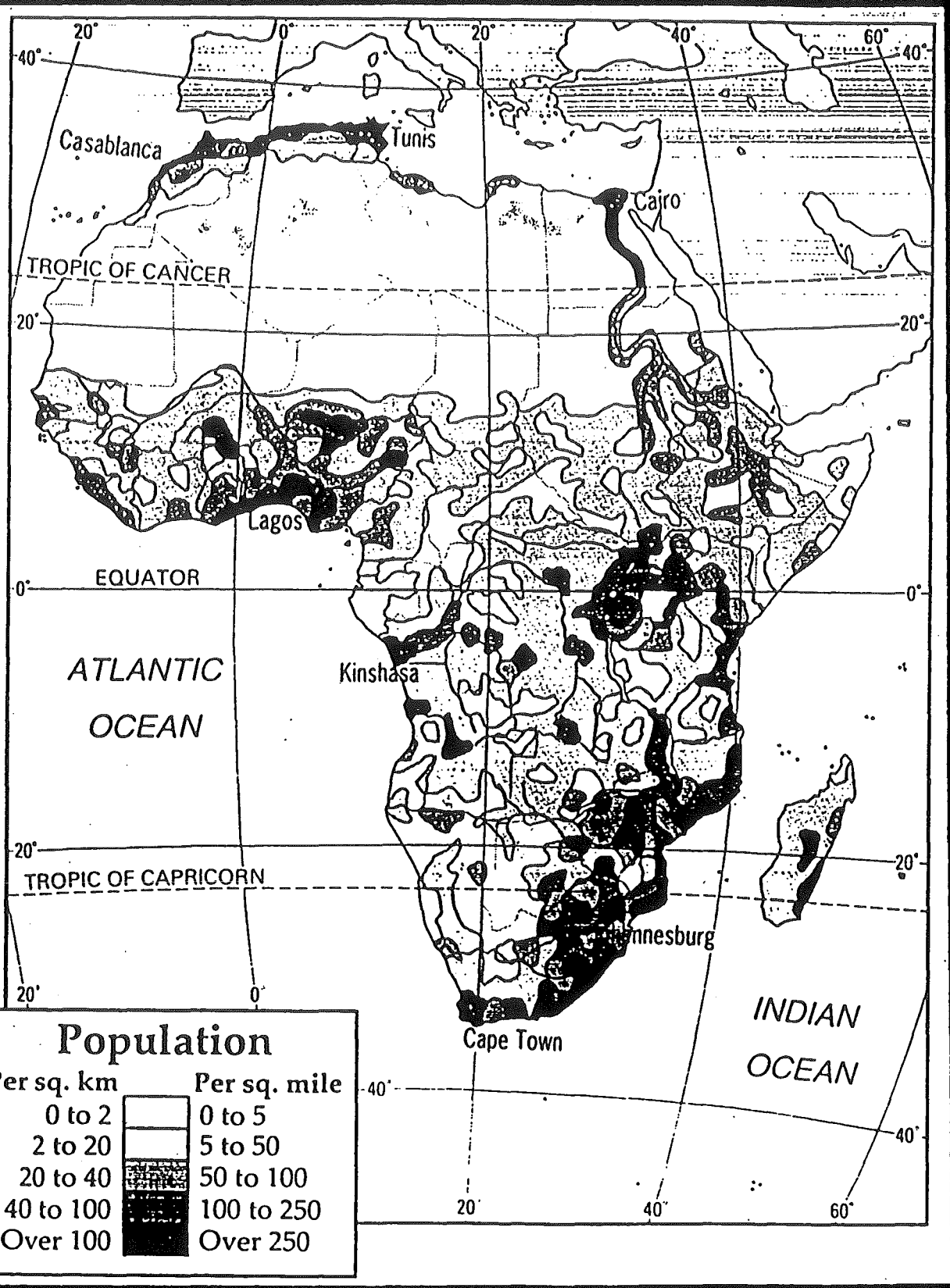
Crops and livestock
Forest products
Nomadic herding
Little or no
commercial activity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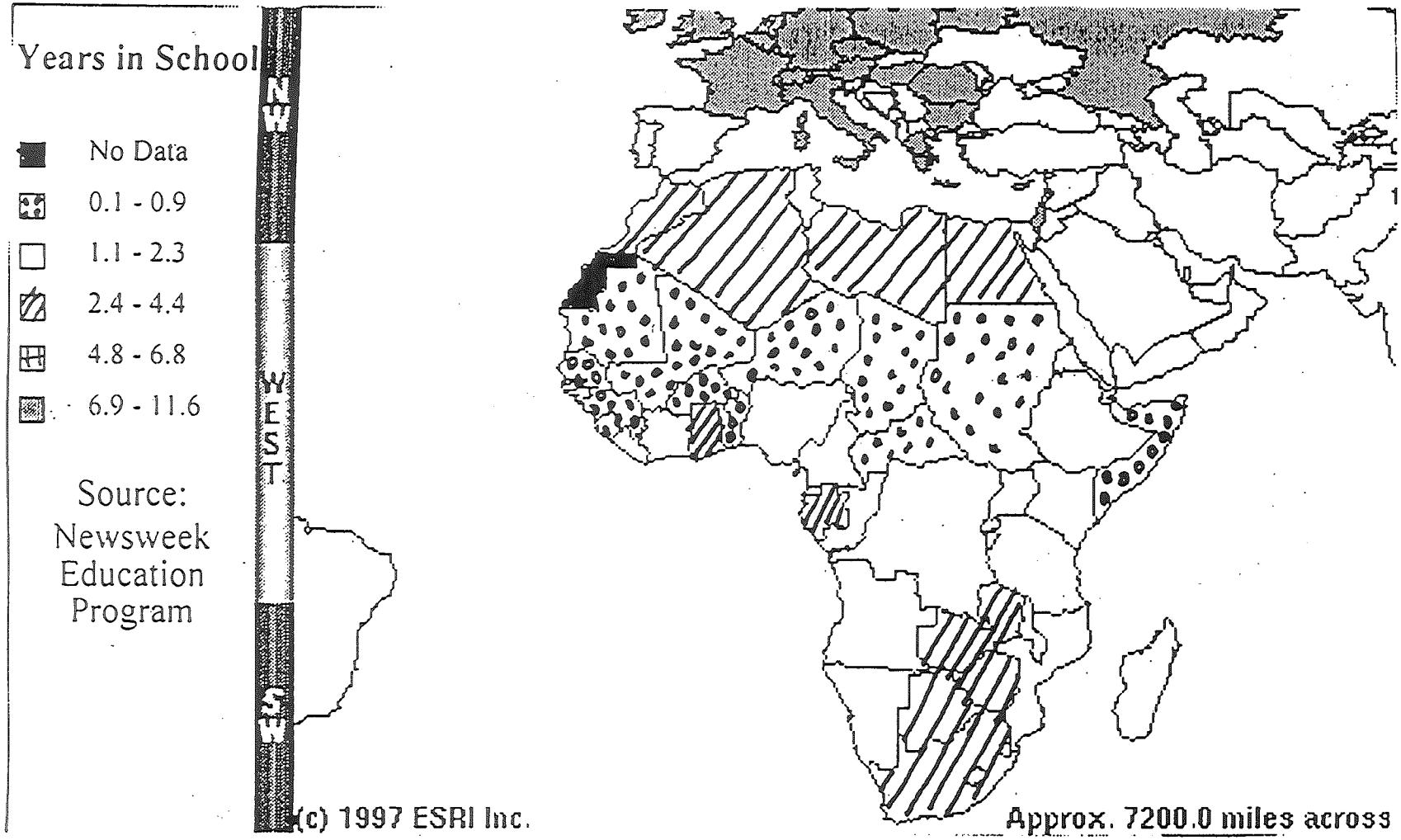
20 to 40
50 to 100
40 to 100
100 to 250
Over 100
Over 250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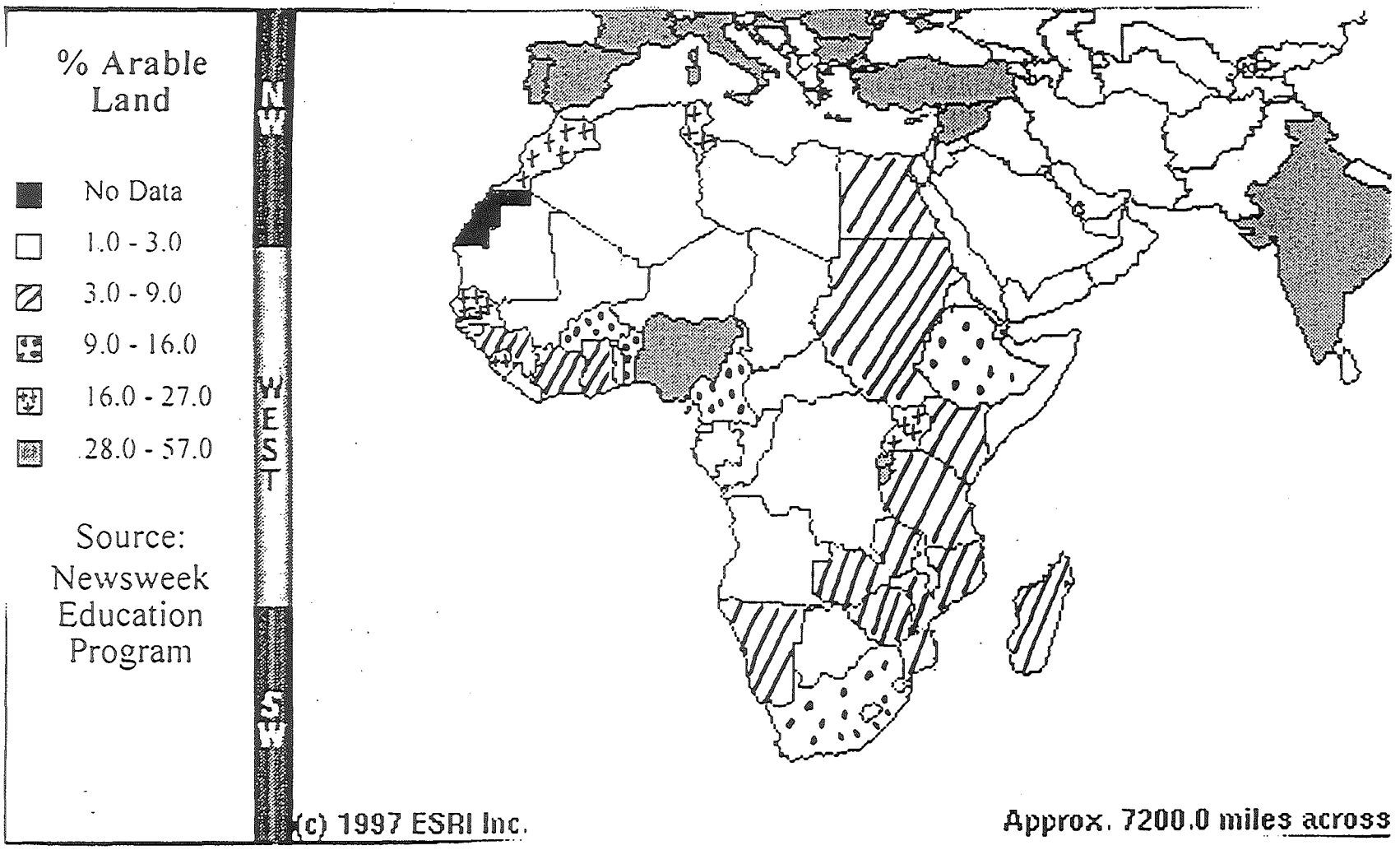
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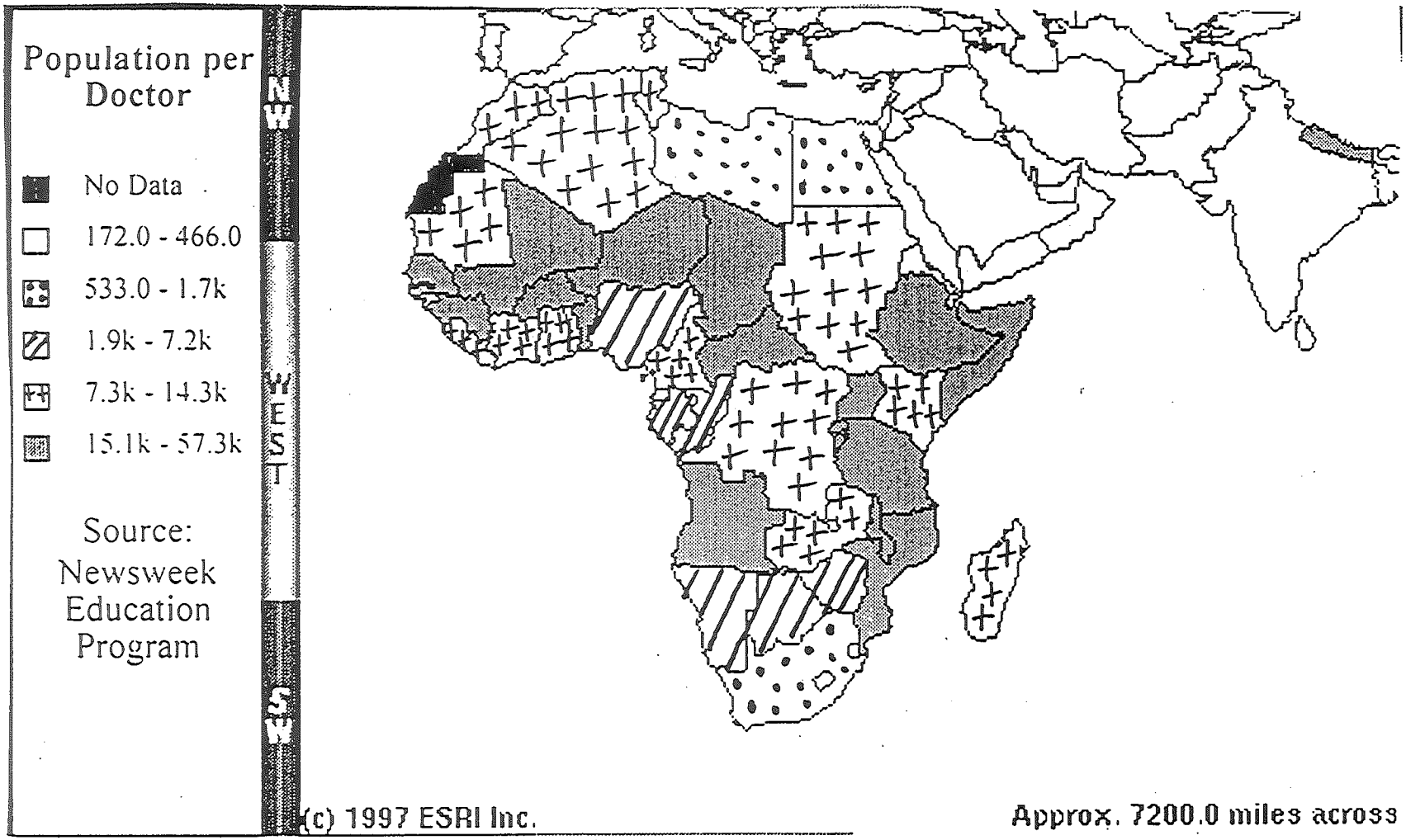
(c) 1997 ESRI Inc.
Approx. 7200.0 miles across


Population per Doctor
No Data
172.0 - 466.0
533.0 - 1.7k
1.9k - 7.2k
7.3k - 14.3k
15.1k - 57.3k
Source: Newsweek Education Program
WEST
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Approx. 7200.0 miles across