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4-H 396 Water Riches for Youth: Leader's Guide

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Water Riches for YOUth

Leader's Guide

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Welcome to Water Riches

Whether you teach science, social studies, math or English, the Water Riches for YOUth! teacher’s guide provides the information you need to guide your students through this rewarding, eye-opening problem-solving experience in public-policy making. As the students solve the contemporary problem of landfill replacement, they will not only learn about water, but also how to solve a problem as a group.

This role-playing activity is versatile, flexible, adaptable and packed full of discovery opportunities for middle school-age youth with a variety of learning styles. It also:

• offers instruction through printed materials, group discussion, videos and laboratory discoveries.
• provides structure to keep the students on-task.
• provides flexibility to allow students to propose alternative solutions and discover consequences.
• encourages students to find and use resources beyond the classroom.
• integrates cross-curricular learning experiences, as well as proven techniques in cooperative learning.
• exposes youth to a variety of career opportunities in water resources and related fields.

Water Riches for YOUth! has been field-tested in a variety of middle school classrooms, ranging from 13 to 110 students. It’s been presented both by individual subject-matter teachers and by interdisciplinary teams and it’s proven to be rewarding to students at every level of academic achievement.

We think you’ll enjoy watching the students apply their creativity skills to work together and solve the landfill problem. With eight different roles to play, students will come to the group with different information relevant to the problem. The activity’s rounds simulate the group decision-making process of the adult world. For example, a water resources engineer may have considerable expertise in groundwater movement, yet may need to learn about the impact on the local economy from a real estate developer.

The discovery process involved in Water Riches for YOUth! will be exciting for both you and your students. We encourage you to challenge your students’ discoveries and reasonings as you facilitate this unique decision-making process.
The Goals and Learning Objectives of Water Riches for YOUth!

Goal: To understand how the environment impacts our water supply.
Objectives: 1. Explain the hydrologic cycle.
2. Explain how water moves in the soil.
3. Identify where groundwater and surface water are stored.
4. Relate how pollution moves through the hydrologic cycle.
5. Give examples of point-source and non-point source pollution of water supplies.
6. Apply water supply knowledge to the landfill location activity.

Goal: To explore the complexities of public policy-making.
Objectives: 1. Explain why conflicts may arise in public-policy making.
2. Demonstrate effective team skills including being prepared, contributing to group discussions, actively listening and disagreeing in a friendly way.
4. Transfer the public policy-making process used in this simulation to other situations.

The Tools

This Teacher’s Guide serves as a playbook to help you facilitate the learning process and provide additional resources to your students. In this book you will find:
• the background you need to coach your students through a successful learning experience.
• ideas about structuring the learning experience.
• the extras you can use to provide enrichment activities for individuals and groups at different levels of interests and abilities.

Program Components
There are five components to Water Riches for YOUth!:
• The group experience
• Individual learning activities
• Videos
• Additional activity suggestions
• Resource listings
A Schematic Look at Water Riches for YOUth

The Process
Form teams
Assign roles and hand out respective booklets
Study the problem
- as a class
- in teams
- individually
- in role groups

The Problem
Hear the scenario
Become familiar with the issue
Work through the booklet
- understand your role
- learn about water
- complete activities
- prepare for team meetings

Participate in team meetings
- share information
- listen to others' point of view
- complete assigned enhancement activities
- evaluate group effectiveness

Meet in role groups
- discuss issues with others with the same role
- complete activities
- visit with outside resource people
- prepare for team discussions
- complete assigned enhancement activities

As a class
- view the videos

Make decisions
- eliminate options in each round
- recommend site

Present recommendations
- class members
- resource people

Single site decision
- each group casts one vote
- elected officials from each team vote
- each class member votes
- outside resource people decide

Follow-up
The Groups

First, students in each classroom need to be divided into groups of eight. Each group will serve as a "team." These teams will remain together throughout the project.

Each individual team member will represent a different role. You may assign roles to each group member, have them draw for their respective roles, have teams themselves, choose who should assume each role or develop another way to decide which student will play what role. The eight roles of the team activity include: the team leader, an elected official, an educator, a developer, a technical expert, a citizen, an activist and a newspaper reporter.

Most classrooms probably do not divide perfectly into groups of eight. One option to equalize the groups is to eliminate specific roles. This will mean, however, that the groups will have less information to base their decision on. Another option is to pair students in roles. Roles such as the citizen, educator or technical expert would be logical choices to have multiple players.

Each team needs to meet at least three times to share information, explore the alternatives and to come up with a recommended site for the landfill.

You will need to monitor groups for progress in their problem-solving process, as well as group functioning.

Individual Learning Experiences

Each team member will receive a role-specific learning activity booklet. The book is divided into three sections, and each section includes an activity to be completed individually by the students. A section should be complete prior to each of the group meetings. Some of the individual learning activities ask youth to make contacts in their communities with people who might be similar roles.

Additional Learning Activities

Additional learning activities are included in this guide for your use. They are divided into two sections: Enhancing the Group Process and Enhancing Science Learning.

You can pick and choose from the activities assigning them to the entire class, teams or to youth with similar roles to carry-out.

Resource Listing

This section provides a listing of local, state and Federal agencies that may have information valuable to the Water Riches for YOUth! project.
Organizing the Project

Water Riches for YOUth! is designed to be very flexible and the project may be organized in a variety of ways. A minimum of 10 class periods will be needed to complete the project and you may wish to team-teach across curricular lines. Depending on the number of enhancement activities you select, the project may extend beyond 10 class periods.

The following outline is provided for a model using one class period a day for 10 days.

Day 1
Assign teams and roles.
Distribute workbooks - assign each student to read up to Section 1 for information about their role and how the project will work.
Complete Room 703 as a warm-up activity.

Day 2
Have students work individually to complete Section 1.
Meet with all Team Leaders to discuss the process and answer questions.

Day 3
Team meetings to complete Round 1.
Have students complete the evaluation for Round 1 (found in the back of their workbook) and discuss as a group.

Day 4
Have students work individually to complete Section 2.
Meet with all Team Leaders to discuss the progress they made in Round 1, problems they encountered and plan for Round 2.

Day 5
Team meeting to complete Round 2.
Have students complete the evaluation for Round 2 found in the back of their workbook and discuss as a group.

Day 6
Have students work individually to complete Section 3.
Meet with all Team Leaders to discuss the progress they made in Round 2, problems the group encountered and plan for Round 3.

Day 7
Team meeting to complete Round 3.
Have students complete the evaluation for Round 3 found in the back of their workbook and discuss as a group.

Day 8
Have teams prepare their final report.

Day 9
Final presentations to the class.
Make a decision about the final site.

Day 10
Process the experience with the class.
Variation: Instead of having students work individually on workbook sections, have students with identical roles meet and work together on each segment. This will give you a chance to meet with each group and monitor for understanding.
The Roles

**Team Leader:** This person must work well with people. The Team Leader must know how to give helpful suggestions, how to politely-- yet firmly-- interrupt an argument that is wasting time, how to delegate responsibility and how to organize meetings and keep them running smoothly.

**Activist:** This person is dedicated to protecting the environment. They may look at things quite differently than other team members. This person’s values may put them in conflict with others on the team who have different values. They are particularly concerned about preserving Site E.

**Citizen:** This person lives near one of the five sites being considered for the landfill. They may have the most at stake personally by the decision, as the placement could affect their own neighborhood. The Citizen will be especially concerned about Site A, as that site is nearest their home. (Note: In the event that you assign more than one citizen to a team, locate the homes of other citizens near different sites.)

**Developer:** This person is interested in purchasing land for commercial development. They will be looking at the financial benefits and drawbacks of the sites under consideration. For this exercise, the Developer will have a special interest in Site C, since the bordering land is being considered for a community recreational facility.

**Educator:** The educator will minimize personal opinion during discussion. Their concern is that the arguments during the group discussions are based on facts. This person will bring a lot of information about water to the discussions.

**Elected Official:** This person represents a county commissioner or other elected official. They will help the group discuss public policy issues. They will work to help the group understand various viewpoints. The Elected Official will have some confidential information about Site D, which is the site being considered for a new highway. Depending on the option you choose for the final outcome, this person may have a vote along with the other Elected Officials in the class as to which site to select.

**Reporter:** This person serves as a media employee and recorder for all group meetings. They will record all activities of the group meeting, as well as serve as a reporter to publicize the group’s activities.

**Technical Expert:** This person represents the scientific community. They will work on laboratory experiments. They will know more about water’s characteristics and movement than most people in this group. This knowledge will help keep the arguments factual during heated discussions.
Student Workbook Contents

Each student workbook contains:
- The Role of the ..... 
- Overview 
- Here's How This Activity Works 
- Moving Through the Rounds 
- Three Special Learning Activities specific to the Role 
- Evaluating Our Progress 

Titles of each of the learning activities by role are listed below:

Team Leader:
Section 1: What is Leadership 
Section 2: Thinking About Goals 
Section 3: Asking the Right Questions 

Activist:
Section 1: How Groundwater Supplies Become Polluted 
Section 2: Wastes- A Potential Contamination 
Section 3: Threats to Quality Water 

Citizen:
Section 1: Identifying the Problem 
Section 2: Dealing with Contaminated Water Supplies 
Section 3: Why a Landfill? 

Developer:
Section 1: Developers Give Life to the Community 
Section 2: About Water 
Section 3: Starting a New Landfill 

Educator:
Section 1: Understanding Water 
Section 2: Facts or Opinions 
Section 3: Understanding Trade-offs 

Elected Official:
Section 1: How Elected Officials Set Public Policy 
Section 2: Establishing Public Policy 
Section 3: Establishing Public Policy, continued 

Reporter:
Section 1: Community Media Inventory 
Section 2: Writing Right for News 
Section 3: Writing a News Story 

Technical Expert:
Section 1: Water: The Universal Solvent 
Section 2: The Hydrologic Cycle 
Section 3: Earth’s Water Supplies
Making a Final Decision

Presentation and Discussion of Recommendations

Each team must ultimately select a landfill site and be able to defend their selection. They should prepare a final report explaining the reasons for their recommendation and present their report to the entire class. In addition, you may want to invite community resource people, such as your Mayor, Natural Resource District official, a land developer or an Extension educator to listen to the students' recommendations.

Allow time for interaction and feedback after the presentations. Some discussion questions that could be used include:

1. What were some of the considerations all teams cited as they shared their final recommendations?
2. Were any of the considerations used in making a decision unique to a particular team?
3. Can you cite examples of differences in how teams interpreted the same information? Why do you think this happened?
4. Can you give examples of how both opinions and facts were used in the presentation of recommendations?
5. Now that you have heard the recommendations of the other groups, what items would you like to be able to go back and look at again?

Making a Final Decision

Option A: Each team is asked to meet one final time, discuss what they have heard and cast a team vote. The team votes are then tallied to decide on the site.

Option B: The elected officials from each team hold a meeting in front of the entire class. They discuss what they have heard in the presentations and then only they vote on the final decision.

Option C: All class members vote on the site.

Option D: If you choose to invite community resource people to listen to the final presentations, you can ask them to discuss the recommendations as the students listen and have them vote on the site.

After the final decision has been made, the class should discuss the process they just went through.

1. How did you feel as others discussed the recommendation you worked on?
2. Can you think of other situations in your family, school, groups or organizations you belong to when you might be asked to prepare a recommendation that may not be accepted?
3. What might happen once a public policy decision like where to site a landfill is made?
Student Assessment and Evaluation - Assessment Ideas

In cooperative learning situations like this one, it is important that each work team is rewarded as group. They need to be positive interdependent, helping each and every member of their team master the materials. At the same time, you will want to build in a way to make sure each team member is mastering the materials.

A variety of tools can be used to assess whether or not the learning objectives described on page 5 of this guide are being accomplished. Spending time observing each team working on the problem, giving team quizzes and tests, reviewing self-assessments with each team after each round and critiquing the team’s final project are all methods of assessing each team’s progress toward achieving the objectives.

It is also important to make sure every group member is learning and understanding the concepts. Selecting and reviewing specific activities from their booklet is an easy way to check on their progress. However, they should not only be mastering what is in their booklet, but also learning additional content from their interactions with team members. This process is known as individual accountability. Some techniques to use when checking for individual accountability include:

• observe team group meetings and ask individual team members to answer questions on the material.
• give each person a written test over all the material and total each team’s score for a total score.
• provide a study guide to each team. Create a test (written or oral) over all the materials and then randomly assign each team an equal number of questions to answer, total the scores and assign a single score to the youth.
• after the group has prepared their final presentation, draw for the team member who will make the presentation.

Plan which assessment techniques you will use and let students know how they will be evaluated before you start the unit. Regardless of the techniques you choose, make sure to provide feedback to both teams and individual students about their progress.
Student Assessment and Evaluation - Self Reflection

It is important to encourage the students to reflect on what they have learned about water and public policy making, and to consider how they might use what they have learned in the future. After each round, the students should complete a self and group assessment in the back of their workbooks. They can put what they have discovered to use almost immediately as they move in to the next round.

After the final site decision is made, students need an opportunity to consider their learnings and think about applications outside the classroom. You may wish to have students keep a journal about their thoughts on the following questions prior to a class discussion:

1. What were the most important ideas you learned about water during this project? Why are these ideas important?

2. Besides this class, where is group decision-making used to make policy in your school? Community? State?

3. What are some public policy issues you’d like to get involved in?

4. What did you learn from this experience that will make you more effective in effecting public policy?

5. If you were going to design a class for newly elected officials who will be involved in setting public policy what are three things you’d include and why?

Meeting Organizers

Site Feature Worksheets

The site feature information is provided to students for use in organizing information on each of the proposed landfill sites. The site maps will provide most of the information for each of the hypothetical locations.

Team Report

If you wish to have a written team report after the completion of each round, you may wish to duplicate this form. You may assign the reporter to be in charge of completing the form. Reviewing the reports may be helpful as you prepare to meet with the Team Leaders.

Final Project

A suggested outline for final class presentations and/or reports can be duplicated and distributed to each team.
Meeting Organizer: Site Features

Encourage students to use a separate sheet for each site to help them organize their thoughts prior to group meetings. Keep notes on each site during the meeting to remember what information they want to discuss during future meetings.

The following pieces of information will help you identify the best landfill sites.

• Features Of Site

• Soil Composition

• Percolation Rate

• Topographical Features

• Geographical Features (Distance To Groundwater, Direction Of Groundwater Flow, Floodplain, Etc.)

• Current Land Usage (Surrounding Area Included)

• Residential Pressure (No. Of Homes, Locations, Home Values, Wells/Sewers, Etc.)

• Utilities (Sewer, Power, Phone, Gaslines, Power Lines, Etc.)

• Transportation/Access (Roads, Railroads)

• Distance From City Limits

• Distance From Central Hub Of City

• Threats To Social Environments (Smell, Birds, Etc.)

• Strongest Reason(s) To Support

• Strongest Reason(s) To Oppose
Meeting Organizer: Team Report

Complete a single team report after each round.

Team members:

_________________________  _______________________

_________________________  _______________________

_________________________  _______________________

_________________________  _______________________

Round ____________________

Date ______________________

Results of any votes taken:

What were your major accomplishments in this round?

What would you like to accomplish at your next team meeting?

Questions that must be researched before your next meeting?
(Indicate who will be researching each question)
Meeting Organizer: Final Project

Each team can prepare a final oral presentation to share their site recommendation with the entire class. A written outline of the presentation should also be prepared. Both the oral and written presentation should include:

• Introduction or listing of team members

• Final site recommendations

• Strengths of selected site

• Weaknesses of selected site

• Plans to overcome weaknesses

• Other alternatives explored

• Consequences of each alternative

• Summary statement

• Questions from audience (oral report only)
Enhancing the Group Learning Experience

Contents:

Room 703
The Creative Problem-Solving Process-BRAINSTORMING
Playing With the Idea
Turning Problems into Possibilities
TV Interview
The Pie of Life
The Many Faces of Communication
ACTIVITY: Room 703

Adapted from “Handbook of Structured Exercise,” John E. Jones and J. Pfeiffer
PURPOSE: To introduce the concept of the team problem solving approach used in Water Riches for YOUth!

You may want to set the stage for the team problem-solving approach used in Water Riches for YOUth! This activity will help students understand the importance of every person contributing to the group process. As in the program, no one has all the information and some have information that is not necessary to the solution. Only by combining and organizing the various pieces of information can the students solve the problem. The main difference between this activity and the Water Riches for YOUth! program is that this activity has one right answer, while the program does not.

MATERIALS:
Information cards, one complete set for each group of 5 or 6 students
A few sheets of paper for each group
At least one pencil or pen for each group
A ruler for each group
A watch or clock for teacher’s use

PROCEDURE:
1. Divide classroom into groups of six or fewer.

2. Distribute the information cards with the instructions that they may read their own card, but may not read others or read theirs to other students. Give at least one card to each member of the group. All cards must be distributed.

3. Say to your students: Your card contains information necessary to solve the following problem: In what sequences are the teachers (by name) in Room 703 during the first four periods of the day? You may read your information aloud to the group, but may not pass it to anyone for them to study. Some of the information is absolutely essential while other information has no importance to this problem.

As a group, share your information, organize it somehow and try to be the first group to come up with the sequence in which the teachers (by name) are in Room 703 during the first four periods of the day. Begin. (Begin timing now)

4. After 5 minutes, write the word “trust” on the board where everyone can see it if they look up. Do not announce it to them.

5. After 8 minutes, write “visual display.”
6. After 14 minutes, write "matrix."

SOLUTION

Correct Answers:
700 Mr. Jones Mr. Lee Ms. Martin Mr. Jacobs
701 Mr. Jacobs Ms. Martin Mr. Lee Mr. Jones
702 Ms. Martin Mr. Jones Mr. Jacobs Mr. Lee
703 Mr. Lee Mr. Jacobs Mr. Jones Ms. Martin

Room 703 Clue Cards

Duplicate the following information to make as many complete sets as the number of groups of five or six you have in your classroom. Cut the sets apart and give at least one card to each group member. All cards must be distributed!

You may tell your group what is on this card, but do not pass it around for others to read.

Card #1
INFORMATION:

Ms. Martin and Mr. Jacobs disagree about how it would be best to handle Room 702, in which there seems to be a history of abusing substitute teachers. The team leader has been at the Robert E. Lucas Intermediate School for five years. The team leader teaches Room 701 during second period

You may tell your group what is on this card, but do not pass it around for others to read.

Card #2
INFORMATION:

Ms. Martin is the team leader for the Intermediate Unit.

Mr. Lee likes to work with Room 700.

Each teacher teaches each group during one of the first four periods of the day.

You may tell your group what is on this card, but do not pass it around for others to read.
Card #3
INFORMATION:

Harry works with Room 702 during second period.

Room 701 has Mr. Lee for a teacher during third period.

You may tell your group what is on this card, but do not pass it around for others to read.

________________________________________

Card #4
INFORMATION:

Mr. Jones and Ms. Martin do not get along well, so they do not work together.

During first period, the team leader, whom Harry likes, teaches Room 702.

You may tell your group what is on this card, but do not pass it around for others to read.

________________________________________

Card #5
INFORMATION:

Each teacher likes a different room best. During the second period, each teacher teaches in the room he or she likes best.

The Robert E. Lucas Intermediate School has two teachers' aides, four teachers and four groups of students.

You may tell your group what is on this card, but do not pass it around for others to read.

________________________________________

Card #6
INFORMATION:

Ms. Martin has been at the Robert E. Lucas School for the shortest period of time.

All teachers teach at the same time and exchange groups at the end of each period.

Mr. Jones teaches Room 701 during the fourth period, but he likes Room 702 best.

You may tell your group what is on this card, but do not pass it around for others to read.
ACTIVITY: The Creative Problem-Solving Process: Brainstorming

PURPOSE: To help youth unlock the creative genius within themselves.

MATERIALS:

- paper
- pens or pencils

BRAINSTORMING

No idea can be a good idea until it becomes an idea. During this experience, ideas will be generated.

Keeping that in mind, there are three very important rules that students must follow:

1. No criticism of any other person’s idea
2. No criticism of any of your own ideas
3. Write down EVERYTHING

Having an idea criticized restricts a person’s willingness to participate in brainstorming.

Furthermore, the brainstorming portion of the creative process is absolutely critical to the effectiveness of the creative experience!

This activity is going to focus on three brainstorming techniques:

- traditional brainstorming,
- forced connections
- brainwriting.

FORCED CONNECTIONS--

A way to generate more ideas:

It’s natural for people to get bogged down during the brainstorming process, but this next exercise will show you how to keep more ideas coming. It’s called, “forced connections.”
Research has shown that the more ideas that are generated, the more creative the solutions (or products, alternatives, etc.).

- First 8 to 10 ideas = traditionally solutions
- Up to 25 ideas = the ideas may or may not generate new solutions
- Beyond 25 ideas = the process kicking in = leads to truly creative solutions

For example: Let’s say the odds are that only five percent of a group’s ideas will turn out to be valid solutions. That means, if five ideas are generated, the group may or may not have one good idea. But, if 150 ideas are generated, even though they may have generated 145 ridiculous ideas, the group may have discovered 7 or 8 possible solutions to the problem.
Which would you rather have?

PROCEDURE:

1. DIVIDE CLASS INTO GROUPS OF 5 TO 8

2. SAY TO THE CLASS:
I am going to guide you through an activity that will open your minds to new ideas. It is called, “brainstorming.” There are two very important rules in this activity:
1. Do not criticize anyone’s idea.
2. Write everything.

Very quickly, please decide on which person in your group will serve as a recorder for this round. This is the only time this person will have to be recorder, so don’t panic. Take one minute, now, to decide who that person will be. (Let groups assign recorder)

3. SAY TO THE RECORDERS: Recorders, your assignment is simple. You write down every idea that is spoken. Don’t try to reword it. Don’t worry about full explanations. Just write as quickly as possible a word or two about each idea. Don’t worry if the idea had already been suggested. That will slow down the process. Just write. You may also say your own ideas. Be sure you say them aloud, as they may generate other ideas from your teammates.

4. SAY TO THE WHOLE CLASS: Class, this is your assignment. I want your group to design the perfect bathtub. Pretend you have unlimited resources—as much money, time and talent as you want or need—and you can defy the laws of nature.
In the next 5 minutes, come up with at least 35 ideas on the perfect bathtub.* Begin now. (Start timing 5 minutes).

5. AFTER TIME IS UP, ASK THE FOLLOWING QUESTIONS:
   . How many had at least 35 ideas? 25 - 35? 15-25?
   . Did any of your groups pass judgment?
   IF YES: What happened when you did? (Slowed down, argued, etc.)
   What did you do? (Told not to judge, stopped giving ideas, etc.)
   Did any group get bogged down?
   IF YES: What did you do? (Gave up, thought of something totally wacky, etc.)

Adapted from materials by Roger Firestien, Ph.D.

*OTHER IDEAS TO BRAINSTORM MIGHT BE: The Perfect Boombox, The Perfect Dash on a
Passenger Car, The Perfect Purse or Make-Up Kit, The Perfect New Sport. THINK UP IDEAS OF YOUR OWN THAT THE STUDENTS CAN RELATE TO.

1. READ TO THE CLASS:
When your ideas slow down, you need to take another angle. Take this pen, for example. (Hold up pen) How might this pen relate to the perfect bathtub? (Let students respond)

Maybe you want to be able to write ideas you think about while you’re taking a bath. So you may want your bathtub to be equipped with a pen that will write on a wet surface. And you may want an area of the wall where you can write notes.

Using forced connections, you take something that may seem totally unrelated to your problem and think of how they could relate to each other.

You can use anything around you. A good place to go if you’re really having trouble is a mail order catalog or the Yellow Pages in the phone book.

Remember to use forced connections whenever you reach a slowdown.

For this session, each group should have two recorders. The rules are the same. Don’t make any judgment on ideas. Be sure to write everything. The recorders can decide how they want to work together—every other idea, or one main recorder and a backup to help when the main recorder gets bogged down. Choose your recorders now. (Allow one minute)

2. READ THE ASSIGNMENT:
Your assignment this time is to come up with 35 MORE ideas on the perfect bathtub. You have 5 minutes. Begin. (Time for 5 minutes)

ASK THE FOLLOWING QUESTIONS:

• How did you do? (Allow response)

• What was different this time? (Crazier ideas, knew what to do when hit slowdown, etc.)
ACTIVITY: Playing With the Idea

PURPOSE: To encourage youth to consider how they might change a solution to make it more workable.

PROCEDURE:
Another way to generate possible solutions to problems is to play with the problem. Use the problem statement “How can groundwater supplies be protected from contamination by our present landfill?” Pretty soon, you may be surprised to find out what you’ve come up with! Allow plenty of time for adequate discussion.

NOTE: If time is a factor, the teacher may choose to illustrate only a few of the following methods of playing with an idea. You may conduct these activities as a class or continue to have the class work in its small groups. Use a recorder (or recorders) as in the brainstorming exercises.

PROBLEM STATEMENT: “How can groundwater supplies be protected from contamination by our present landfill?”

1. ADAPT, CHANGE CONTEXTS
   - What different perspectives can your students find in studying the landfill problem?
   - How might the landfill be used for other purposes?
   - Is there a way to use contaminated water?
   - How could this problem be used in an historical context?
   - How might the problem look from a futuristic point of view?

2. IMAGINE
   - What unusual “What if?” questions can be asked?
   - How far-out can you make your questions?

3. REVERSE
   - What happens if you look at your problem backwards?
   - How does it look upside down?
   - What about turning it inside out?

4. CONNECT
   - What can you combine your problem with?
   - How does your problem fit in with other things you know about?

5. COMPARE
   - What similarity does your problem have with:

6. ELIMINATE
   - What rules can you break?
   - What is outdated?
   - What things can’t be talked about?
- What is no longer necessary?

7. JOKE AROUND
- How can I make the problem seem silly?
- What can I laugh about?
- How can I make the problem even more ridiculous?
- What jokes can I think up about the problem?

8. INCUBATE
- What ideas should I “sleep on?” (NEXT DAY OR TWO...)
- What ideas did I think of later?

ACTIVITY: Turning Problems into Possibilities
PURPOSE: For groups to identify ways to overcome barriers.

PROCEDURE:
Problems pop up in our lives every day. A good problem-solver understands problems can be turned into possibilities simply by rewriting the problems into possibilities.

1. Provide each group with the list of problem statements. Review the examples given on the handout with the youth. Point out that while problems are usually statements, possibilities are often questions. Possibilities often use the adverbs who, what, where, why and how.
2. Have groups create possibility statements for each problem.
3. Ask groups to share some of their possibilities with the entire class.
4. Have groups discuss within their own teams.
   - What are some of the problem statements we have been using in our group?
   - What are some ways to create possibilities from our problems?

PROBLEM:  
It costs too much.

POSSIBILITY STATEMENT:  
How do we get enough money?  
How could we reduce the cost?

We don’t have enough space.

POSSIBILITY STATEMENT:  
Where is a place big enough to hold the event?  
How much space do we need?  
How could we do it with less space?

I don’t have time.

I don’t have any help.

I don’t know how to do it.

I’m not good enough.

There’s not enough water.

It’s bad for the environment.

It takes too long.
ACTIVITY: TV Interview

PURPOSE: To help youth understand themselves and the strengths they bring to the team.

PROCEDURE:
Have a friend serve as a talk-show host or hostess. Let that person interview you using the following questions, or others you come up with. Another option is to videotape your interview for others to see. Make sure the interview lasts no longer than six minutes.
1. What's your name?
2. How old are you?
3. Now that I've asked you to be on my program, why should people care?
4. Have you done anything extraordinary with your life?
5. What kinds of extraordinary things do you expect to accomplish in your lifetime?
6. By what age do you expect that to happen?
7. Why is that accomplishment important to you?
8. How did you get interested in doing that?
9. What did you do (or are you doing) that made that accomplishment possible?
10. Besides this accomplishment, what other things would you like to have people know you for?

ACTIVITY: The Pie Of Life

PURPOSE: To help youth examine how they use their time and identify ways to better utilize this resource.

PROCEDURE: Complete the following exercise.

The Pie of Life

NAME: ____________________________

Before you can be a really good leader, you have to understand yourself. Understanding, "what makes you tick," your "hot buttons" and what kind of "vibes" you send can make a big difference in how you work with others. For this exercise, be honest with yourself...about yourself.

Examine how you spend your time. This exercise will give you some new information on what you value and how you spend your time during a school day.

How many hours do you spend (the hours should total 24):
- sleeping __________
- being with friends __________
- working away from home (include school) __________
- doing chores at home (include studying) __________
- pursuing a hobby by yourself __________
- eating __________
- doing other things (name a few) __________

Now draw a pie graph that represents 24 hours in a day. Divide the pie into sections to represent how you use your time in a typical weekday during school.
INTERPRETING:
Looking at the pie, do you think you are spending too much time at any one activity? If yes, which one(s)?

Write a goal statement about how you would intend to make that change (those changes) happen.

How do you think your pie will look five years from now? 10 years from now?

Do you think it is okay to spend your time differently 10 years from now than you do today? Why or why not?

ACTIVITY: The Many Faces of Communication
PURPOSE: To become more conscious of the messages they are sending to each other.

PROCEDURE:
1. Have the students brainstorm a list of the different ways we communicate. Some of the items on your list might include: speaking, listening, writing, facial expressions, body language and electronic transmission (computers).

2. Once you have a list of ways we communicate, assign a different method to small groups of students. Direct each group to create two lists of examples, the behaviors or actions that would make that type of communication positive and their lists of actions that would make the communication negative. Have each group report their lists. If you have time, you may want to have each group do two short skits to demonstrate their lists.

3. After hearing the reports, have the teams meet and discuss the following questions:
   1. What are some of the ways we have been communicating in our group?
   2. What are some of the positive communication skills members have used?
   3. What are some of the negative communication skills members have used?
   4. How do negative communication skills affect our group?
   5. What are some things we might work on to improve our communication?
ACTIVITY: The Team Deck
PURPOSE: To help team members recognize and share the contributions others make to the group.

PROCEDURE:
1. Provide each student with a 3 x 5 notecard and have them write their name on one side of the card. Have the students place the notecards from their team in a stack, names down, in the center of the group. Mix the cards and have each student draw one card. Write one specific item of praise for the person whose name is on the card they drew. Remind students that for praise to be meaningful, it needs to be concrete and specific. For example, "I'm glad you're on our team because you help us stay focused on our work."

2. Have students pass the cards to the student whose name appears on the card.

This activity can be repeated a number of times with the same card. Simply have the students put the cards back in the stack, shuffle, draw and add to what is written on the card.
Enhancing Science Learning

Contents:

The Water Planet Activities
Build a mini Hydrologic Cycle
Finding Sources of Contamination
Protecting Water
Removing Pollutants From Groundwater
Exploring the Surface Tension of Water
Exploring the Properties of Water
Water: The Universal Solvent
Earth: The Water Planet Activities

The National Science Teachers Association publication, “Earth: The Water Planet” contains many activities that can be used for “Water Riches for YOUTH!” The student manuals also make reference to several of the activities in “Earth: The Water Planet.” The activities specifically suggested, with the NSTA description, are:

Can Water Move Through “Solid Rock?”
Uses an unglazed clay flowerpot as a model to show how the “solid rock” of aquifers can transport water underground.

How Fast Does Soil Absorb Water?
Is an outdoor activity that allows students to collect data on the rate of water absorption of local soils.

Is It Full Now?
Demonstrates that soil has empty space (pores) between its particles. Below the water table, all of these empty spaces are filled with water.

How Much Water Can Different Soils Hold?
Compares the water absorbing properties of “rich,” high-humus soil with those of a “poor,” humus-lacking soil.

Put a Cloud in a Bottle
Allows students to form a cloud in a soft drink bottle. The activity demonstrates how condensation nuclei and pressure changes allow clouds to form.

Taking the Swamp Out of “Swamp Water”
Simulates the process by which water treatment makes water safe to drink.

Changing States is a Breeze
Shows that moving air can speed the process of changing water from a liquid to a gas.

Feeling the Heat Makes My Molecules Dance
Uses a heat source to speed the process of changing water from a liquid to a gas.

Saved by the Greenhouse
Uses a small model of a greenhouse to investigate the rate of evaporation in a closed space.

How Does Water Climb Sand Dunes?
Demonstrates capillary action “pulling” water up through dry sand.

Desert Rescue
Challenges students to apply their knowledge of water’s properties of adhesion and cohesion to find a creative solution to the problem of transporting water through midair without spilling any.

“Earth: The Water Planet” is available for purchase from the National Science Teachers Association, 1742 Connecticut Avenue, NW, Washington, D.C., 20009.
ACTIVITY: Build A Mini Hydrologic Cycle

PURPOSE: To demonstrate the principles of the hydrologic cycle.

BACKGROUND:
Water is always moving in a never-ending cycle on and around the earth. Since the beginning of time, the earth has had approximately the same water on it. Water is not added or destroyed— it just changes forms and keeps cycling.

Water can exist in three forms—liquid, gas and solid.

In its liquid form, we see water as rain, surface water, fog and clouds. It also exists as groundwater. The gaseous form of liquid, known as water vapor, is invisible. And when water exists in temperatures 32°F and below, it crystallizes into a solid form such as ice, sleet or snow.

Water gets into the atmosphere by turning from liquid to vapor, which is carried into the atmosphere in the warm air that is heated by the sun. The heated air rises because it is lighter than cool air.

As the warm, moist air rises, it meets with cooler air and eventually condenses. As vapor condenses, the water turns back into liquid droplets.

When the droplets get too heavy to be held in the sky, they fall as precipitation, which feeds plants and adds to the earth’s supply of surface water, such as rivers, lakes, oceans and groundwater.

Groundwater is stored in the soil layers and aquifers under the earth’s surface. Plants get moisture from the soil through their roots. People pump groundwater to the surface through wells that are dug into the aquifer.

When plants use water, they put some of it back into the atmosphere through a process called “transpiration.” Areas of surface water recharge water back into the atmosphere through a process called “evaporation.” Both of these processes see water changing to its gaseous form, so the water cycle is complete and continues once again.

MATERIALS:
• pairs of glass jars with same-size mouths
• water
• food coloring
• rock
• tape
• direct sunlight or heat lamp

A heat lamp will provide the most flexibility in observing different reactions to variables—prolonged heat, heat on/heat off, changes in shorter intervals. If a heat lamp is not available, east, south and west window exposures can provide enough temperature variation to create interesting observations.

Some condensation may be observed by the end of the first class period. As the experiment is allowed to sit over several days, changes will occur, such as fungus forming on the glass. Different classes may observe different reactions, depending on the time of day they are available to observe (i.e., if lights are off overnight, first-period students will notice different responses than sixth-period classes).
PROCEDURE:
1. Pour an inch of colored water in one jar.
2. Place the rock in the center.
3. Invert the other jar over it and tape closed.
4. Place the jars in a warm, lighted place. Observe the containers during the given intervals (other classes may have to respond to certain timeframes), and respond to the following questions on a separate sheet:
   - 30 minutes:
   - 90 minutes:
   - 2 hours:
   - 24 hours:
   - 1 week:
5. Describe what you see collecting on the inside of the glass. Does the food coloring travel through the cycle?
6. Explain where the moisture came from and why it settled on the glass.
7. Relate the different parts of the model to earth and the hydrologic cycle.
   - water represents ____________________
   - rock represents ____________________
   - air represents ____________________
   - heat and light represents _____________
   - moisture on side of jar represents _____________

DISCUSSION POINTS AND ANSWERS TO QUESTIONS 5-7.
5. As the difference between the temperatures inside the jars and the glass itself widens, increased condensation will occur. The food coloring will concentrate on the bottom surface of the container as the water vapor escapes. The coloring will not form on the sides of the jars with the droplets.

6. What is happening?
   Heating trapped air in a sealed glass container forces the water molecules to “dance” wildly, generating additional energy and causing the interior temperature to rise. The rock also absorbs that heat and continues to contribute to a higher air temperature than that on the surface of the glass. As the water molecules hit the glass, they cool and slow down their motion. This allows the adhesive and cohesive properties of the water molecules to hold themselves together and form droplets. Thus, the invisible vapor becomes a visible liquid once again. If the experiment is allowed to develop for several days, impurities from the rock and air will create a fungus on the surface of the glass.

7. Water represents surface water. The rock represents the earth’s surface. The air represents itself. Heat and light represents the sun’s energy. Moisture on the inside of the jars represents the water vapor that is in the atmosphere, which can be seen when in its liquid state—as in clouds, during rain, etc.

8. SUGGESTIONS FOR FURTHER STUDY
   Conduct the experiment with each group incorporating its own variables—two empty jars, two other jars with only a leaf of living plant in the lower one, two others with steam only trapped inside, etc. Have each group observe and record the differences in what happens.
ACTIVITY: Finding Sources of Contamination
PURPOSE: To identify sources of water contaminations.

PROCEDURE:
1. Have students study the illustration. Using their understanding of how water moves through soils, ask them to describe how groundwater supplies can get contaminated. You may want the students to write a brief report for you to review or circle the areas on the illustration that threaten the groundwater supply. Tell them to be prepared to defend their answers when asked to explain.

With each possible polluter, have the students describe whether it is a point-source pollution hazard or a nonpoint-source pollution hazard and why. A dictionary or science resource book may help them understand “point-source” and “nonpoint-source” pollution.

2. Ask the students to list at least 10 ways they can think of that groundwater and surface water supplies can and have become polluted. After each, indicate whether the cause was natural or resulted from the activities of people and whether it is an example of point-source or nonpoint-source pollution.

ACTIVITY: Protecting Water
PURPOSE: To identify ways to protect and conserve our water supply.

PROCEDURE:
As potential polluters of our planet’s water supplies, we need to be more aware of how to prevent water pollution. In the space provided, list as many ways as you can think of to help prevent unnecessary water pollution.

The list may include both direct influences, such as not pouring gasoline down a drain and indirect influences like teaching their family how to dispose of wastes properly.

Protecting water supplies also means using less, “conserving,” so there will be enough for everyone’s needs. In the space provided, list as many ways as you can think of to help conserve water. Again, your list may include both direct and indirect conservation methods.
ACTIVITY: Pollutants in Groundwater
PURPOSE: To demonstrate why cleaning polluted groundwater is difficult.

BACKGROUND:
When a landfill site is chosen, particular attention must be paid to the location of the landfill in relation to the groundwater. The landfill site must have a soil structure that absorbs any leachate, and will prevent the movement of the leachate to the groundwater.

Vocabulary:
Leachate: The low-quality liquid generated by precipitation percolating through a landfill or other deposited solid waste.

MATERIALS:
• clear plastic cup
• malt straw
• eye dropper (thin neck, if possible)
• marbles, enough to fill cup
• mineral oil
• food coloring
• sharp-pointed tool

PROCEDURE:
1. Place the marbles in the plastic cup and cover them with mineral oil. The marbles will be the “soil” and the mineral oil the “groundwater.”

2. Use a sharp object to poke several holes near one end of a straw. Wedge the straw between the marbles in the cup. The straw serves as a “well,” so the mineral oil will slowly move through the holes and into the straw—just like groundwater moves into a well. Cut the straw off so only a short length remains above the top of the marbles.

3. Using the eye dropper, place two or three drops of food coloring outside of the straw and deep within the mineral oil. The food coloring simulates polluting leachate from a landfill.

4. Insert the eye dropper into the straw (well) and remove some of the mineral oil. Observe the action of the food coloring (leachate) when the mineral oil (groundwater) is removed from the straw. Does the coloring come out with the mineral oil or does it stay in the cup?

5. Repeat this procedure several times, each time observing and recording if the food coloring enters the straw, stays in one place, or moves throughout the marbles in the cup.

DISCUSSION:
1. What happened to the pollution when you removed water from the well?
2. How does this mini-experiment differ from leachate and groundwater movement through soils?
ACTIVITIES: Exploring the Surface Tension of Water

PURPOSE: To demonstrate the strength of surface tension film.

BACKGROUND:
The strong attraction among water molecules (cohesion), caused by hydrogen bonding, produces what scientists call SURFACE TENSION FILM. Water molecules form a layer (film) on the water’s surface. This film creates a boundary between the air and water.

MATERIALS:
- water
- eye dropper
- waxed paper
- toothpicks
- liquid detergent

PROCEDURE:
1. Place a drop of water on waxed paper and PUSH the drop around with a toothpick. On a separate sheet of paper, describe the action.

2. Now PULL the toothpick through the water droplet. Describe the action.

3. Does the water droplet break apart or appear to stretch? Why?

4. Now dip the toothpick into liquid detergent and touch it to the droplet. Describe the reaction. What does the detergent do to the surface tension film?

BACKGROUND:
If you were small and light enough, you could actually walk on water just like the small insects you see in ponds and streams. One type of aquatic insect, the water strider, walks on the surface tension film of water.

MATERIALS:
- water
- eye dropper
- toothpicks
- liquid detergent
- sewing needles
- small drinking glasses
- 3" petri dishes or small shallow tray
- tissue paper cut into approximately 2" x 2" squares
PROCEDURE:
1. Slowly fill a small glass with water. Carefully add drops of water until the water level is above the top of the rim. On your separate sheet, explain why the water piles up above the rim of the glass.

2. Place a sewing needle on a small piece of tissue paper. Fill a petri dish or small shallow tray with water. Place the tissue and needle on the water’s surface. With a pencil, carefully push the tissue under the water, being sure not to touch the needle. Describe the results.

3. The needle does not float, but actually lies on top of the water. What causes this?

4. Now, dip a toothpick into liquid detergent and dip it into the water near the needle. Describe and explain the reaction.

5. The surface tension film is surprisingly strong. Try using different objects (paper clips, sand particles, metal shavings, etc.) to see if the surface film will support them.

BACKGROUND:
The film that is formed by the water molecules actually separate the water from the air, prohibiting air from entering the spaces between the water molecules.

MATERIALS:
• waterproof basin
• pint jars
• jar cap collars (canning ring) with window screen insets
• 4" square cardboard for each experiment
• water

PROCEDURE:
1. Read the entire procedure instructions and record hypothesis on a separate sheet of paper.

2. Fill the jar 2/3 full of water. Screw jar cap collar with screen inset onto jar. Hold cardboard securely over collar, making certain no air spaces exist between cardboard and collar.

3. Holding the covered jar over a waterproof basin, invert jar and cardboard and carefully SLIDE cardboard off to one side of collar until completely removed from contact with collar. HINT: Keep cardboard horizontal and touching the collar’s edges while completing this step. Illustration, inverted jar with canning lid, window screen, water and cardboard flat across lid.

4. Record the results and explain.
ACTIVITY: Exploring the Properties of Water

PURPOSE: To illustrate how water molecules act in their various states.

BACKGROUND:
If you dip your finger into water, a drop of water clings to your finger. This single drop contains millions of water MOLECULES. Water is made up of more than one ATOM type—two atoms of the ELEMENT, hydrogen and one atom of the element, oxygen. Because its atoms are different, water also is called a COMPOUND.

Water is a simple compound, made up of only two elements. But because of the molecules' structure, water has many unique properties. Water molecules also are very small—about 900 sextillion in one ounce of water. That's 900,000,000,000,000,000,000,000!

MATERIALS:
• circle guides (jar lids, cups, etc.), two different sizes
• construction paper, at least two different colors
• pencils, pens or markers
• scissors
• tape or glue

PROCEDURE:
1. Using the example drawing, make at least three models of a water molecule. Using two different-sized round objects (jar lids, cups, etc.) and two different colors of construction paper, trace and cut out one large and two smaller circles for each molecule. The large disc will represent the oxygen atom: label it with an “O.” The smaller discs will represent the hydrogen atoms; label them with an “H.” Attach them using glue or tape. The next paragraph explains how to join them together as they would naturally.
   The two hydrogen atoms are attached to one side of the oxygen atom. The oxygen end of the molecule has a negative (-) charge, while the hydrogen end has a positive (+) charge.

2. Thinking about how a magnet works, can you see how this produces a very strong attraction between water molecules? The positive end of the molecule is attracted to the negative end of another molecule. This bond that holds them together is called the HYDROGEN BOND.

In all matter—water included—molecules are in constant motion, alternately attracting and repelling each other. This will be important to remember as you study the properties of water.

3. Working with a partner, place at least six molecule models on a flat surface with no two molecules touching. This represents water in its GASEOUS form, called WATER VAPOR. In this form, few hydrogen bonds form between molecules because they have so much heat energy. In this form, the molecules are free to move around. Remember, molecules always bounce around in constant motion.

On a separate sheet of paper, draw a sample of water molecules in their gaseous state.
4. Now place the molecule models side by side, making sure all molecules make at least one correct contact (positive to negative only). This is how the water molecules appear in a drop of water. Remember, opposite ends will attract and the like ends will repel.

Draw a sample of water molecules in their liquid state:

As water cools, the molecules lose energy and begin to cluster tighter together. This process continues until it reaches 39° Fahrenheit (4° Celsius). Water is the most dense at this temperature and takes up the least amount of space for the number of molecules.

5. Arrange the molecule models in the most compact position possible, remembering like ends will never touch, but opposite ends may touch more than one molecule at a time. This represents water at its densest state.

Draw a sample of water molecules at 39° F:

Below 39° F, molecules begin forming hydrogen bonds with surrounding molecules and the water begins to expand.

6. Now arrange the molecules so each hydrogen (H) atom touches only one oxygen (O) atom. This represents water in its SOLID form, as ice.

Draw a sample of water molecules as they appear when in solid state.

Notice the molecules take up more space as a solid than as a liquid. In the solid state, water molecules do not move much at all and form rigid, hollow crystals, such as snowflakes or ice crystals.

After completing the activities with the molecule models, have the students respond to these questions.
1. Based on what you’ve seen, is ice more or less dense than water?

2. Knowing this (answer 1), is ice heavier or lighter than water as a liquid? (Think about the amount of air spaces that exist in water as a liquid compared to its frozen state.)

3. If your answer in Question 2 makes sense, then should ice float or sink?

4. Does ice float or sink in water?

5. Based on your answers above, how does that affect marine life in the winter?

For additional information, see “What is Water” in Earth: The Water Planet, pp. 170-172.
**ACTIVITY: Water: The Universal Solvent**

PURPOSE: To evaluate how easily water dissolves various substances.

BACKGROUND:
Water molecules not only are strongly attracted to other water molecules, but are also attracted to molecules of many different compounds and the atoms of many elements. This makes water a good dissolving agent. That's why water is known as the UNIVERSAL SOLVENT.

Water's dissolving power is determined by two basic factors: 1) the nature (makeup) of the substance being dissolved and 2) the temperature of the water. The following two activities help demonstrate these two factors.

How does water dissolve something? They separate and surround the molecules of the substance as it is dissolved.

If the molecules are large and strongly bonded together, as with gelatin, the substance will not dissolve easily.

If the molecules are complex, as oil molecules are, the water molecules are actually repelled and no dissolving occurs.

MATERIALS:
- sugar
- salt
- baking soda
- gelatin (dry)
- vegetable oil
- containers for each of these substances
- warm water
- teaspoons

PROCEDURE:
1. Tell the students to look at the list of substances. Have the students write their hypothesis of how well water will dissolve the substances—Easily, Somewhat or Poorly—on a separate sheet of paper.

2. Dissolve a teaspoon of each of the listed substances in a cup of warm water. Record how well each one dissolves—Easily, Somewhat or Poorly.

3. Discuss the differences and why they exist.
PURPOSE: To evaluate the effect that water temperature has on the amount of sugar that water will dissolve.

BACKGROUND: Although water cannot dissolve everything, many substances will dissolve more easily in hot rather than cold water. The process of dissolving requires energy, and hot water has more energy than cold water.

MATERIALS:
• sugar
• container
• teaspoon
• stirring stick or spoon
• hot water
• iced or ice-cold water

PROCEDURE:
1. Read the procedure to the class and have students record their hypothesis before beginning the experiment.

2. Add a level teaspoon of sugar to one cup of hot water.

3. Stir until all the sugar is dissolved.

4. Continue adding sugar, one teaspoon at a time, until no more dissolves.

5. Record the number of teaspoons of sugar dissolved.

6. Repeat the activity above, using iced water instead of hot water.

7. Discuss the results. How did the actual outcome agree with or differ from your hypothesis? What was the actual difference in dissolving power between hot and cold water?
Resource Listing

There are many places where more information on water and natural resources issues is available. The following listing of state, local and Federal agencies may have information to use in the Water Riches for YOUTH! project. Some key publications are listed. Don’t forget to utilize local agencies, "experts" and libraries in your community. There are many professional, commodity and special interest organizations that also have useful information. You may need to help students evaluate information that is received from the various sources.

Cooperative Extension, Institute of Agricultural and Natural Resources
211 Ag Hall
University of Nebraska-Lincoln
P.O. Box 830703
Lincoln, NE 68583-0703
(402)472-2966

A variety of publications on water, public policy, pollution and other topics are available, as well as other resources. Extension Educators are located in most counties in the state.

Conservation & Survey Division
113 Nebraska Hall
University of Nebraska-Lincoln
P.O. Box 880517
Lincoln, NE 68588-0517
(402)472-3471

A variety of maps and publications are available. Key publications include:

Flat Water: A History of Nebraska and Its Water Resource Reports-12, 1993

Water Center/Environmental Programs
103 Natural Resources Hall
University of Nebraska-Lincoln
P.O. Box 830844
Lincoln, NE 68583-0844
(402)472-3305

Occurrence of Pesticides and Nitrates in Nebraska’s Groundwater, WC1, 1990

Water-Nebraska’s Most Precious Resource—Where to Get Water Information in Nebraska, 1992

Nebraska Natural Resources Commission
PO Box 94876
Lincoln, NE 68509-4876
(402)471-2081
Nebraska Environmental Education and Information Resources Directory, 1990
South Platte NRD
551 Parkland Drive
PO Box 294
Sidney, NE 69162
(308)254-2377

Twin Platte NRD
United Nebraska Bank Center
111 S. Dewey Street
PO Box 1347
North Platte, NE 69103-1347
(308)535-8080

Central Platte NRD
215 N. Kaufman Avenue
Grand Island, NE 68803
(308)381-5825

Lower Platte North NRD
Commercial Park Road
PO Box 126
Wahoo, NE 68066
(402)443-4675

Lower Platte South NRD
3125 Portia Street
PO Box 83581
Lincoln, NE 68501-3581
(402)476-2729

Upper Republican NRD
135 W. 5th Street
Imperial, NE 69033
(308)882-5173

Middle Republican NRD
220 Center Street
PO Box 81
Curtis, NE 69025
(308)367-4281

Lower Republican NRD
Courthouse
PO Box 618
Alma, NE 68920
(308)928-2182

Tri-Basin NRD
1308 - 2nd Street
Holdrege, NE 68949
(308)995-6688 & 995-5168

U.S. Environmental Protection Agency
726 Minnesota Avenue
Kansas City, KS 66101
(913)551-7431

U.S. Geological Survey
Room 406, Federal Building
100 Centennial Mall, North
Lincoln, NE 68508-3883
(402)437-5082

U.S. Fish & Wildlife Service
Federal Building
203 W. 2nd Street
Grand Island, NE 68801
(308)381-5571

Bureau of Reclamation
PO Box 1607
Grand Island, NE 68802
(308)381-5501

Soil Conservation Service-USDA
Federal Building, Room 152
100 Centennial Mall, North
Lincoln, NE 68508-3866
(402)437-5301

SCS has offices located in most counties in the state. The county offices will have information on local soils.
Building Coalitions for Understanding Community Issues

Georgia L. Stevens, Extension Family Economics Policy Specialist, University of Nebraska-Lincoln

The process of building community understanding is an important one, regardless of the area of concern. As more and more citizens recognize a particular problem, that problem moves from the private to the public domain and requires the involvement of a larger segment of the community. The process of involving the whole community is relevant to any area of policy-making.

How can citizens get started in building community understanding? The process begins with the awareness of a problem. Individuals may work together in a group or coalition to address the problem. After that beginning awareness, the process of building community understanding follows eight basic steps (Figure 1).

Decision-Making Steps for Citizen Action

Step 1: As a public policy issue develops, the first step is to recognize and express concern about the problem. What do other community leaders and citizens think about this problem? Where can you get facts and figures for your own community? How have nearby communities dealt with a similar problem?

Step 2: Become involved and identify all players. Can you think of other persons who also could be involved? Who else can you talk with? Talking with others who share your viewpoints is usually not difficult. Challenge yourself also to think of community members who may not share your ideas. Recognize that not everyone sees issues in the same way. Are there ways to involve these persons in the initial discussions so that all of the community begins working together on the issue and moves beyond their own individual perspectives?

Step 3: Clarify the issue by learning the extent of the problem. Work at trying to understand all sides of the issue. You can talk with other citizens and community leaders to further define and clarify the issue. Can you be open-minded and set aside your own solutions for the problem? Are you willing to explore other peoples’ ideas? Do you recognize that not everyone sees issues in the same way?

Steps 4 and 5: Consider the choices (alternatives) available and identify their effects (consequences). These are the two most critical steps in decision-making. Examining all alternatives and consequences demands that you identify existing alternatives and brainstorm for new ones. For example, you could consider the alternative of applying for government grants to financially support an assessment of your problem or to secure funding for making changes. Perhaps you could invite private businesses to bid on new construction. An often overlooked alternative is that of organizing a voluntary effort for citizens to contribute resources that may help solve the problem. Doing nothing can be considered an alternative. Explore the positive and negative consequences for people on all sides of the issue.

Step 6: After all alternatives and their consequences have been considered, it is time to make a choice. Typically, the citizen does not directly make the choice at this step, but does so indirectly by electing and influencing policymakers who are responsible for doing so. Your challenge at this step is to learn how public decisions are made, who makes them and how citizens can participate. You will be able to inform others of the choice that has been made.

Step 7: Commit to a course of action once an alternative is chosen. Your role in activating the choice can be to provide input to the policymaker as procedures are developed for a new facility. You can identify previous pitfalls and learn what the new procedures will require.

Step 8: Citizens usually evaluate decisions informally as they experience and react to the new solutions. Satisfied with the results, you might move on to other activities.

The above eight steps can be repeated. If you feel that the issue is still not resolved, you may start the decision-making steps over again. Concern that “something should be done” is a signal the steps may need to be repeated.
Assessing Local Needs

Expressing concern about the problem was identified earlier as the first step in citizen action. It is important in this step to:

- Look for causes, not just symptoms of these causes.
- Ask tough questions so you understand what is going on.
- Gather facts and check them with the experts.
- Discover local needs by collecting information.

To make a case for your concern, you need more than opinions or hearsay about the problem. You need documented evidence that a problem exists.

How do you demonstrate your concern is a "real" problem in your community?

One way to verify the problem is to conduct a local needs study. A study of the current situation can identify strengths and weaknesses in services currently offered. As you think about studying local needs, consider the types of groups or agencies in your community that may already be collecting information.

You might consider hiring professionals to conduct your needs study. Agency staff or educators from local schools, community colleges or universities may be able to provide the expertise needed to design a survey, code the data, analyze the results statistically and write a report for community distribution.

It may be possible to have volunteers gather information for a needs study. For example, a student might conduct the study for an advanced Scouting badge. Other communities might use high school classes (e.g., civics, government) to gather information and then distribute it to interested citizens and policymakers. Many grant funding groups provide start-up dollars that enable a community to gather information as the first step in documenting the need for additional services. Documents of this sort can be used to seek additional funding.

Locally collected information will provide data to support your issue. It also can provide a means for looking toward the future and beginning to think about the services that will be needed. Consider a variety of ways to use the gathered information. Work with radio and newspaper reporters to suggest story ideas. Talk with elected officials about the information from the study.
Maintaining a Network for Local Involvement

The second step in public decision-making for citizen action was to become involved and to identify all players. To begin developing a network for local involvement, you will want to:

• Gain support from other people in the community.
• Develop a list of groups and individuals who might be interested in knowing more about this issue.
• Arrange an “open” meeting for discussion among interested parties.
• Publicize the issue through the media (newspaper, radio and television) and meetings.

As you decide when and how to “go public” with your issue, be sure that the facts are accurate and that you are well prepared. Remember that the more public you go, the more prepared your argument must be.

Are there key people in your community who should be involved in the issue? Consider members of the media, elected boards and other influential people as you develop your list of contacts.

As you identify local resources, draw a diagram on paper to check who has been included and whether the entire community has been considered. Write each person’s name down the left side of the paper. Across the top of the paper, list the following: occupation, age, male/female, racial background, special skills (public speaker, writer, organizer, financial manager, grant writer) and time available (very busy, willing to help, travels a lot). Other categories may be helpful as you develop a diverse list of community members.

Summary

Building a base of community understanding for citizen action on an issue often is not easy. Timing is important because many needs exist at the same time in a community. Consider the other problems facing your community as you develop a plan for citizen action. Does your area have seasons of the year that are particularly busy for citizens? Do you have an upcoming election that could promote citizen participation on your issue?

The time spent in studying local needs can serve as the basis for your issue but also for related issues. Be willing to share your experiences with others. Build and maintain a network of citizens wanting to be involved.

Be realistic about the time it may take to educate others about the issue and to gain their involvement. Our democracy works best when citizens have had a chance to study an issue, discuss the various alternatives available, consider the consequences of each alternative and understand how policy decisions are made.

References

Solid Waste Overview

The waste in our garbage cans is trash only when it is all mixed together. When trash is separated into individual components, it is a “mother lode” of resources which can be reused or recycled into new products. Nearly all household waste can be converted to another use to avoid disposing of it. After we have exhausted the possibilities for recycling or finding new uses for our trash, only a few materials remain. These “leftovers” can then be examined to see if we could have found another product or material which is recyclable that could have served the same purpose.

The choice of whether to trash or reuse our resources is up to us. We each make this choice every time we purchase a product or decide we no longer need something. These daily choices, multiplied by millions of people, have major effects upon our environment. Using recycled or secondary materials instead of virgin or primary resources to meet our daily needs can save large amounts of energy and dramatically reduce air and water pollution (if the transportation and energy to recover the resources are not excessive.) These resource savings and reductions in pollution can increase the health of our community and economy. In order to help our community turn waste into resources, Master Recycler/Composters (MRCs) will need to first understand:

1) What is in our trash cans.
2) How it gets there.
3) What happens to it after we “throw it away?”

This chapter looks into our garbage. We will begin our investigation by uncovering the birth of garbage dumps in ancient Athens. Discussion will then shift to how wastes are currently being managed in Lancaster County. The chapter will conclude with an overview of solid waste management alternatives and what Lincoln, Lancaster County and the State of Nebraska are doing to encourage waste reduction and recycling.

The History of Garbage

The solid waste problem has existed at least as long as people have lived in cities. Prior to the concentration of people living in cities, wastes which were almost entirely organic materials derived from plants and animals, were either burned for fuel, used as crop fertilizers or fed to livestock. Little went to waste. All of the animal was consumed, there was not much to throw away. Also, in the case of people who subsisted by hunting and gathering, these communities often moved before the garbage heap became a problem. These types of waste management are still practiced in some rural regions of the world.

As populations became concentrated in larger towns and cities, their garbage heaps also grew. People could not just pack up and move a city when the heap got too big. As cities spread out and became increasingly farther away from their food sources, organic waste was no longer useful to them - it became “garbage.” The old habits of throwing wastes out the door to animals or into the garden posed public health problems in the densely populated cities.

Some cities, notably in parts of the Orient, solved their garbage problem by hauling organic wastes out to farms and composting it to revitalize crop lands. Another solution was to simply take garbage out to the countryside and dump it in piles. Around 500 B.C., Athens issued the first-known law against throwing garbage in the streets, requiring scavengers to dump wastes no less than one mile outside the city walls: Thus the open dump was officially born.

Remarkably, 2,500 years after Athens’ first garbage edicts, open dumps are still the predominant waste disposal method in our advanced industrial society. Of course, dumping practices have evolved over time. As cities grew and spaces for dumping trash became scarce, dumps became centralized and evolved into burial pits which were covered with soil. These are known as sanitary landfills.

The first garbage dumps were in Athens, in 500 B.C. Today, centuries later, approximately 70-75 percent of America’s municipal solid waste is still disposed of in landfills. Times are changing, however, and all across the country cities are changing the way they handle their solid waste: buying smarter, recycling more, using less.
A modern waste disposal facility such as Lincoln/Lancaster County's Bluff Road Landfill is a far cry from those early scattered dump heaps. To begin with, many of the wastes that we send to the landfill are made of materials which were beyond the wildest dreams of Greek citizen in 500 B.C. Our modern solid waste stream includes glass, complex metal alloys, plastics, construction materials made from a mix of several substances, a wide array of paper, and products such as paints, cleaning agents and pesticides - which can harm the environment if disposed of improperly.

The pie chart in figure I-2 gives us an approximate picture of what is in our garbage. The Environmental Protection Agency (EPA) reported in July of 1992 that nationally, paper is the largest component (37.5%) of the waste stream, with yard waste/food/wood refuse (organics) following at 24.6%. Glass constitutes 6.7%, plastic products account for 8.3%, and metal wastes supply 8.3% of the total waste stream. The "other" category (14.6%) includes such things as tires, textiles, hazardous wastes, rocks, dirt, old furniture, batteries, drywall, and multimaterial packaging. These percentages are based on the weight of the solid waste analyzed as compared to reports that give the volume of the solid wastes.

Other variables, beside the weight or volume, can affect the percentages of a solid waste stream break-down. Reports do vary from site to site and depending on whether the measurement was made before or after recyclables were removed. Also, percents will be altered depending on where and if construction and demolition wastes are included and on how other specific materials are sorted into the categories. Another aspect of the varying solid waste reports is whether the sorts were completed on household trash cans (before the landfill) or on landfill digs (which vary with each site.)

Figure I-2. Lancaster County's waste composition
Another thing that would baffle our ancient Greek friends is the sheer volume of things that we throw away. Since most of what was thrown away in ancient Athens was organic and has long ago decomposed, we cannot accurately determine how much waste the average Athenian threw out. Yet we can get a feel for how waste generation has grown by looking at how our own garbage generation rate has grown over just the past thirty years.

The chart in Figure I-3 shows that the average American generated about 2.5 pounds of trash each day thirty years ago. Today we are producing between 3 and 5 pounds per person daily. In Lancaster County, the solid waste generation rate equals the national averages in both residential waste (4.3 lbs/person/day) and commercial waste (3 lbs/person/day), which includes business and industry. Of course, individual households and businesses do differ in their waste production, depending on how they purchase goods and what they reuse or throw away.

Few people would suggest that we should give up all of our life--simplifying, even life-saving, products or our technological advances in order to return to the relatively simple waste disposal methods of the year 500 B.C. However, much of the increase in our waste stream is not directly tied to improvements in the quality of our lives. This is demonstrated by the fact that affluent European nations including France, Italy and West Germany are able to maintain a standard of living, comparable to that in the United States while generating only half as much waste per person as we do.

The lower waste generation rates listed in Figure I-4 International Garbage Competition, can be attributed to the use of fewer disposable products and less packaging, more reliance on refillable containers, and to higher recycling rates.

Figure I-3. Pounds of trash generated per person per day in the U.S., 1960-2000.
In many countries, such as Japan, recycling is necessary due to limited natural resources, the lack of space to landfill waste, and the depletion of forests and other resources. In the United States today, two powerful forces are behind our interest in recycling:

1) A shortage of places to put garbage.
2) The cost of making landfills environmentally safe and limiting their impacts on groundwater and other resources.

As our urban areas have expanded and the amount of trash we generate has increased, undeveloped land for dumping garbage has become scarce. The spread of suburban development leaves few large parcels of land available that are far from residential development, yet close to urban waste generating centers. Across the country, proposed new landfill sites have been greeted by potential neighbors with a cry of “Not In My Backyard!” often shortened to “NIMBY.”

Nebraska Integrated Solid Waste Management Act

Community concerns over having a landfill for a neighbor are heightened by recent events. Years of uncontrolled dumping have sometimes resulted in a mixture of toxic materials in our landfills, often made up of unknown wastes. Many landfills have become U.S. EPA nominated toxic waste “Superfund” sites. Rainwater, washing through a landfill picks up dissolved chemicals creating a toxic leachate which, if not contained, can contaminate streams and groundwater. Because organic wastes are decomposing in the absence of oxygen in the landfill, they create methane gas which is explosive in high concentrations and may migrate into neighboring homes if not vented properly.

Figure I-4. Average per capita waste generation for different nations.
In response to these and other problems around the country, the State of Nebraska enacted The Integrated Solid Waste Management Act (LB 1257) in 1992 in compliance with the Subtitle D reauthorization of the Resource Conservation and Recovery Act. It established standards for the handling of all types of solid waste, instituted a hierarchy of handling options in addition to landfilling, and set regulations for the permitting, siting, operation and closure of all landfills in Nebraska. This act also provided target recycling and waste reduction guidelines of 25% by July 1996, 40% by July 1999 and 50% by July 2002.

New landfills must meet stringent siting standards related to soil geology, proximity to wells and aquifers and impacts on neighboring land uses. These standards require that new and existing landfills install impermeable liners below new burial areas to collect leachate for treatment; that methane gas be vented or utilized and that systems are established to monitor potential surface and groundwater contamination. In addition, these monitoring and control activities must continue long after the landfill is closed. As a result of these new standards, many landfills operated by cities or private organizations are closing because they cannot afford to meet the EPA and state regulations which insure public and environmental health.

Figure I-5. Conceptualization of Bluff Road Landfill design.
Under LB 1257, existing landfills in the State must be brought up to minimum standards by October 1, 1993, including licensing, operations and closure procedures. As of 1990, Nebraska had 260 unlicensed dumps, most in rural areas and small communities. In 1990, the Nebraska Department of Environmental Quality (NDEQ) conducted an environmental assessment on five of these 260 unlicensed sites, finding all five in situations of possible noncompliance with the operation guidelines. These illegal dumps had to bring their facilities up to modern standards by October 1994 or they were closed to further use. To assist in the compliance, grants are available to counties, municipalities and joint public entities planning and implementing waste management facilities in accordance to the goals of the act.

To further guide communities in establishing volume reduction and recycling priorities, the act prohibits the disposal of the following items in landfills after the specified dates:

- **September 1, 1994**: Yard waste, Lead acid batteries, Waste oil (auto)
- **September, 1, 1995**: Whole tires, Household appliances (white goods)
- **September 1, 1996**: Unregulated hazardous waste, except household hazardous waste

Carrying out the requirements of LB 1257 and the Resource Conservation and Recovery Act is a giant step toward minimizing many of the environmental problems associated with landfills. However, these improvements come at great cost. A large part of the garbage rate increases in Lancaster County and around the nation in recent years has been the result of bringing our landfills up to environmentally safe standards and establishing cash reserves for the eventual closure of these facilities.

When the cost of upgrading landfills to comply with the state standards is added to the current cost of developing new sites and operating landfill disposal facilities, we can begin to see the true costs of burying our waste in landfills. The increased cost of landfilling waste has had the most recent effect of making waste reduction, recycling, and composting a more feasible alternative to disposal.

In the end, when all the parts of the garbage revolution are added up, the bottom line is that landfills are no longer an easy, inexpensive solution to our solid waste disposal needs. We will never be able to completely eliminate the need for landfills, but we must start to decrease the wasteful use of them as repositories for our discarded resources. After over 2,500 years of dumping, we must begin changing our habits.

**Solid Waste Management in Lancaster County**

A typical solid waste management system has three components:

1) Collection
2) Transfer
3) Disposal

Today these are augmented by separation and processing of recyclable and compostable materials before and after collection.
Collection

In most parts of the county, trash is picked up at every residence and business. Trash collection in Lancaster County is performed by private hauling companies. The responsibility for billing and for setting collection rates and service levels is handled by each independent garbage hauler. Some communities, like Omaha, have begun separated trash collection providing residents with special bags or bins for placing recyclables next to their regular trash at the curb.

In Lincoln there are a few curbside recycling businesses who will contract with private individuals to pick-up a variety of separated recyclables at the curb or door-step. The cost of this pick-up service varies, usually $5 for two pick-ups per month. Each curbside recycler should be contacted to determine the frequency of pick-up, cost of service and the proper preparation and separation of materials.

Transfer

In Lincoln and Lancaster County most of the trash collected from residents and businesses by private garbage haulers is taken directly to the Bluff Road Landfill. In many larger cities, it is necessary for them to create transfer stations to load and compact trash from garbage collection trucks into semi-trailers for transport to a landfill disposal facility. Transfer stations allow garbage haulers to spend more time picking up waste rather than travelling great distances to dump their loads in far away landfills. And since four to five garbage truck loads can fit into one semi-trailer, traffic to and from the landfill is decreased, saving energy, time and money.

Lincoln presently has one transfer station, which is provided primarily to service the five percent of the population in this area that chose to haul their own trash or those small businesses like home remodelers and lawn service firms that generate special waste. Approximately 200 small vehicles bring solid waste to the 48th Street Transfer Station on a daily basis. These smaller loads are transferred to a semi-trailer which is taken to the Bluff Road Landfill for disposal when full. The 48th Street Transfer Station also accepts white goods (large appliances), lead-acid batteries and waste oil for recycling, brush and compostable yard waste.

The 48th Street Transfer Station is located at 5101 North 48th Street 93/4 mile north of Superior) and is open Monday through Friday 6:45 a.m. to 3:00 p.m.; Saturday and Sunday 6:45 a.m. to 12:00 p.m. On Saturdays during the summer (daylight savings time) the afternoon hours are extended, 6:45 a.m. to 3:00 p.m. The Transfer Station is closed for Thanksgiving, Christmas and New Year’s Day. For further information call the Landfill Transfer Station information line at 441-7738.

Disposal

The final destination for all of Lincoln’s non-recycled wastes is the landfill. At the landfill, wastes are spread in layers within lined pits and compacted by large bulldozers. At the end of each day wastes are covered with a layer of soil to discourage odors, rodents and birds. Once a pit or landfill cell is full, it is covered with topsoil and planted with ground cover to control erosion. The landfill also has systems for collecting the leachate that is formed when rainwater seeps through the garbage heap, and for monitoring groundwater for potential contamination. As the landfill grows, a collection system will be installed to collect the methane gas that is generated as organic materials in the dump decay in the absence of oxygen.

Bluff Road is Lancaster County’s primary landfill, receiving most of the county’s buried wastes. A special construction and demolition waste landfill is maintained at the 48th Street Transfer Station, receiving nonflammable wastes such as concrete, rubble and dirt. Other materials being diverted from the Bluff Road Landfill in the last three years include yard wastes (20,000 tons in 1992-93), sludge from the waste water treatment facility (22,000 tons in 1992-93) and recyclable items taken to private recyclers (50,000 tons in 1992-93). This diversion of materials has already resulted in a 19% decrease in the amount of solid waste being buried at the Bluff Road Landfill.
Bluff Road occupies a 200-acre site, located on North 56th and Bluff Road, three miles north of Superior on Highway 77. The Bluff Road landfill will hold approximately 17 million cubic yards of waste over its projected life. It took four years and $4.5 million to site and construct this landfill.

Alternatives for Solid Waste Management

Over the past several years, Lincoln and Lancaster County, like other communities across the nation, has explored a number of solutions to the mounting garbage crisis. Studies have focused on the following five techniques: source reduction, recycling, mixed waste processing, incineration and landfilling.

- **Source reduction** refers to all the things we can do to reduce the amount of solid waste requiring either disposal or centralized recycling or composting. Examples of source reduction include selective shopping, product or packaging avoidance and reuse and home composting.

- **Recycling** refers to systems that collect, process and market individual materials from waste stream, such as paper, glass, metals or plastics, so they can be made into new products or packaging.

- **Mixed waste processing** refers to a facility that processes garbage into recyclables, compost and disposable waste. These systems can recover up to three-quarters of the waste stream by extracting recyclables, inert and hazardous materials using a variety of mechanical and hand-sorting methods. The remaining organic waste (foods, yard and paper wastes) is converted into compost.

- **Incineration** systems burn mixed solid waste to reduce its volume and extract energy in the form of heat and/or electricity.

- **Landfilling** is the process of burying solid wastes underground.

Each of these methods has several variations. For instance, incineration systems that burn garbage can include facilities to remove recyclable materials and hazardous waste before burning to create a relatively clean fuel. Or, garbage may be burned without any sorting of recyclables. It is important to note that any solid waste management system at this time must include a landfill component because not all waste can be recycled or incinerated.

Table I-1 summarizes the basic concepts and lists some of the advantages and disadvantages of each waste management alternative. In the past, solid waste management systems relied on landfills. Now, most communities are diversifying their approach to solid waste management and developing source reduction, recycling, mixed waste processing and/or incineration systems to reduce the volume of wastes heading for landfill disposal.

In 1992, the Mayor’s Environmental Management Plan, Phase I Steering Committee analyzed the various solid waste disposal techniques and obtained feedback from the public regarding the various options. The Committee made nine recommendations that were approved by the Lincoln City Council and Lancaster County Board. In addition, the rural communities in Lancaster County have agreed to work with the City of Lincoln in implementing the new plan.
<table>
<thead>
<tr>
<th>SYSTEM</th>
<th>TECHNIQUE</th>
<th>ADVANTAGES</th>
<th>DISADVANTAGES</th>
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<tbody>
<tr>
<td>Waste Reduction</td>
<td>Education</td>
<td>Low cost</td>
<td>Relies on behavior changes</td>
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<td></td>
<td>Packaging changes</td>
<td>Becomes a habit</td>
<td>Hard to measure impact</td>
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<td></td>
<td>Rate incentives</td>
<td>Save energy and resources</td>
<td>Opposition from manufacturers</td>
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<td></td>
<td>Home composting</td>
<td>Reduces dependence on landfills/incinerators</td>
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<td>Careful shopping</td>
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<td></td>
<td>Reuse of products</td>
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<tr>
<td>Recycling</td>
<td>Education</td>
<td>Saves energy and resources</td>
<td>Relies on behavior changes</td>
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<tr>
<td></td>
<td>Citizen participation</td>
<td>Reduces dependence on landfills/incinerators</td>
<td>Dependent on markets for materials and products</td>
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<td></td>
<td>Collection</td>
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<td></td>
<td>Processing</td>
<td>Creates more jobs than other alternatives</td>
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<td>Market development</td>
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<td>Production of new products</td>
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<td></td>
<td>Purchase by consumers</td>
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<td>Landfilling</td>
<td>New local landfills with</td>
<td>Proven method</td>
<td>Expensive to ship wastes to distant sites</td>
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<td></td>
<td>environmental controls</td>
<td>No behavior change needed</td>
<td>Wastes both renewable and non-renewable resources</td>
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<td></td>
<td>Landfills in distant, non-</td>
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<td>Expensive to meet federal and state functioning</td>
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<td>urban areas</td>
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<td>standards NIMBY</td>
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<td>Mixed Waste</td>
<td>Mixed waste is sorted to</td>
<td>Includes recycling and all its benefits</td>
<td>Dependent on markets for compost and recycled items</td>
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<td>Processing</td>
<td>recover recyclables</td>
<td>Potential markets for compost produced</td>
<td>Requires large capital investment</td>
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<td>Organic fraction (yard</td>
<td>Not dependent on behavior changes</td>
<td>Some contamination of</td>
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<td>and food waste, dirty</td>
<td>changes-recyclables</td>
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<td>paper) is composted</td>
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<td>Other materials incinerated</td>
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<td></td>
<td>or landfilled</td>
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<td>Incineration</td>
<td>Mixed waste burned to</td>
<td>Ready market for electricity</td>
<td>Ash residue may be toxic and require special</td>
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<td></td>
<td>generate electricity</td>
<td>No behavior changes needed</td>
<td>landfilling</td>
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<td>Generally includes removal</td>
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<td>Toxic air emissions</td>
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<td>Public opposition</td>
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<td></td>
<td>More energy saved by recycling than by burning</td>
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<td>NIMBY</td>
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Phase I of the plan dealt with volume reduction. The goal of the Phase I planning process was to “Develop a recommendation for an economically feasible and environmentally sound solid waste management system for Lincoln and Lancaster County which protects public health, the environment and extends the life of the Bluff Road Landfill.” The study examined the existing solid waste management system for Lincoln/Lancaster County, paying particular attention to the type of waste generated in Lincoln, the current method of disposal, the current collection and recycling systems and the administration and budgeting of the municipal landfill. The Steering committee commissioned analysis of administrative factors and conducted public hearings and polls to determine the best options for our local needs.

In February 1992, the Steering Committee presented nine recommendations in their report to the Mayor. It was recommended that the landfill gate fees should be increased to completely cover the cost of landfill operations, and that certain items should be regulated or diverted from the landfill. Items to be recycled or diverted include yard waste, construction and demolition wastes, automotive oils, household hazardous wastes, tires and white goods. The study determined that incineration of municipal waste is not feasible for Lincoln at this time and that curbside recycling should be encouraged to develop but not made mandatory by the City. Finally, the Steering Committee recommended that the current system of multi-material recycling drop-off sites be expanded throughout the City and County and that commercial waste diversion and recycling should be expanded and encouraged.

Phase II was completed in the Spring of 1993 and dealt with recommendations on the environmental and public health issues of handling and disposing of our solid wastes. In response to the Clean Air Act, the City of Lincoln is already withholding household appliances from the landfill and having these goods recycled by a local contractor who will recover all ozone-depleting gases from the units and part-out the recyclable metal parts. The 48th Street Transfer Station has been set up to handle the separation and recycling of several types of hazardous materials including lead-acid batteries, automobile waste oil and the above-mentioned white goods.

In preparation for future statewide bans on yard wastes in Nebraska landfills, the City of Lincoln has already begun their yard waste education and recycling program, banning yard wastes from the Bluff Road Landfill during the peak seasons and diverting these organic wastes into a municipal composting site. Although yard wastes will not be officially banned from all state landfills until September of 1994, the Lincoln City Council set aside April to November of the next two years as yard waste ban periods, when all yard waste must be diverted from the landfill.

Master Recycler/Composters and the Future of Lancaster County’s Garbage

The environmental and economic consequences of our waste disposal habits are catching up with us. We are being forced to reassess our attitudes about garbage and how we use resources. If we don’t want to be overrun by garbage, we must change our ways.

Lincoln has chosen to pursue a forward-thinking and balanced approach to its solid waste problems which emphasizes waste reduction, recycling, composting and use of environmentally sound landfills to handle the remaining non-recyclable waste. This approach requires not only technical changes, but human behavioral ones as well. The success of this approach will rely on the cooperation of all Lancaster County citizens. Cooperation will be achieved through citizens understanding our city’s solid waste situation and becoming aware of the options they have for waste reduction and recycling. Through knowledge, citizens can make informed decisions about waste disposal practices.

MRCs play a key role in educating and building awareness in the citizens of Lincoln. As MRCs, you will inform and inspire people to change their current disposal habits. The next chapter examines waste reduction and “precycling” practices, learning how to shop wisely and avoid purchasing wasteful, non-recyclable goods. In following chapters you will learn how recycling works - from the collection of recyclables through to the purchase of recycled products and how to start your own home composting operation. The final chapter discusses how MRCs can be effective communicators and educators.
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