Flooded Documents Experiment

What happens to history when documents are damaged by water, and can humans or AI recover the information?

Grades 6–12 · Science / Social Studies / AI Literacy; Mississippi River Flood of 1927 Centennial

Module Overview

Students explore how flooding damages books and historical documents, starting with a hands-on book-soaking experiment. They then investigate how modern preservation techniques, human interpretation, and artificial intelligence can help recover and protect information. In an optional advanced extension, students take on an archive rescue project: they evaluate AI reconstructions for accuracy, analyze damaged records with forensic tools, and gather oral histories from community members. Along the way, they see how technology and human perspective work together to preserve history for future generations.

- **Lesson 1: When Books Flood (Book Soaking Experiment).** A short lesson. Students soak and dry a paperback book, observe the physical damage, and consider how a family in 1927 Mississippi would have tried to save its records.
- **Lesson 2: Can We Recover the Past?** A longer, more advanced lesson. Students create their own "archive," flood it under controlled conditions, preserve what they can, and compare human and AI interpretations of the damaged documents.
- **Lesson 3: The Great Archive Rescue.** An optional advanced extension. Teachers choose from activities such as testing whether AI invents details, using forensic recovery tools, and creating oral histories.

Quick Links

Lesson 1

Lesson 2

Lesson 3

Vocabulary

Standards

Essential Questions:

- How does water damage affect the preservation of information?
- What challenges do historians and archivists face when interpreting damaged materials?
- How do humans and AI differ when reading incomplete or damaged documents?
- Why is preserving historical information important after disasters?
- How does physical damage change our understanding of history?
- What information can still be recovered from damaged artifacts?
- How do scientists, archivists, and historians work together to preserve the past?

Knowledge Checklist:

Teacher knowledge. Before teaching, teachers should be familiar with:

Historical and archival concepts

- The basics of the Great Mississippi Flood of 1927 and its historical significance. This video is a good place to start: https://m.youtube.com/watch?v=Fs89pLjhtf0
- Why floods damage paper records, photographs, maps, and books
- The role of archives, museums, and libraries in disaster recovery
- The importance of preserving primary sources

Scientific concepts

- How water affects paper, ink, adhesives, and photographs
- Mold growth and deterioration after flooding
- Experimental variables: flood duration, water type (clean, muddy, saltwater), drying methods, and material type

Student knowledge. Students will understand…

- How floods damage historical records, from physical damage to loss of information.
- Basic archival preservation concepts, including metadata and documentation.
- The accuracy, bias, and limitations of AI when interpreting damaged documents.
- That some people's and communities' histories are more likely than others to be lost in a disaster.

Skills Checklist

Students will be able to…

- Make and record observations, including qualitative and quantitative data
- Form hypotheses and design an experiment with variables and controls
- Evaluate experimental evidence and draw conclusions based on evidence
- Interpret damaged documents and rate their confidence
- Compare human and AI interpretations and identify AI hallucinations
- Document their work scientifically

Module Sequence

Lesson	Focus	Duration
Lesson 1: When Books Flood	Book soaking experiment: soak 24 hours, dry 48 hours, compare results	3–4 days elapsed, with short daily check-ins
Lesson 2: Can We Recover the Past?	Create an archive, flood it, preserve it, then compare human and AI interpretation	3 blocks (5 days)
Lesson 3: The Great Archive Rescue (optional)	Teacher-selected extension activities	Varies by activity

Teachers can run Lesson 1 as a short stand-alone experiment or use Lesson 2 for a deeper investigation. Lesson 3 activities can follow either one.

Teacher Notes

- **Background:** See the background information folders.
- **Safety and logistics:** Avoid mold growth, valuable books, and irreplaceable materials. Use discarded library books, books with no covers (destined to be destroyed), photocopies, and recreated documents. Never flood real historical documents.
- **AI tools:** Lesson 2 asks students to use AI tools. Check your district's AI policy and each tool's age requirements before class and plan a teacher-led demonstration if students can't use the tools themselves.
- **Connection:** Return to the "1926 Backpack" list from Life Along the Mississippi River Before 1927 after the experiment and ask: Which things could never truly be replaced?

- **Core concept:** Help students see a progression that goes beyond “water ruins books”: Flood → physical damage → loss of legibility → loss of information → gaps in the documentary record → changes in how history can be understood.

Five especially important distinctions

For **middle school students**, make sure they leave the experiment understanding these pairs:

- Absorption → Saturation: Paper first takes up water; eventually it may hold as much water as it can.
- Observation → Interpretation: “The page has a brown stain” is an observation. “Floodwater permanently damaged the document” is an interpretation that needs supporting evidence.
- Preservation → Conservation: Preservation tries to prevent damage; conservation tries to stabilize or repair damage.
- Document → Primary Source: An old document becomes historical evidence when we use it to investigate the past.
- Physical damage → Information loss: This is probably the most important conceptual connection. A flood doesn't just damage paper. It can damage information—and information about some people and communities may be impossible to recover.

A useful concept to emphasize

These terms allow students to see a progression that goes beyond “water ruins books”:

Flood → physical damage → loss of legibility → loss of information → gaps in the documentary record → changes in how history can be understood.

Lesson 1: When Books Flood (Book Soaking Experiment)

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Time: 3–4 days elapsed (24 hours soaking, 48 hours drying), with short daily check-ins

Students conduct a hands-on experiment to explore how flooding affects books and printed materials. They observe physical damage, investigate how water affects written information, and discuss the challenges of preserving documents after a flood.

Objectives

SWBAT:

- Simulate the effect of extreme water damage and flooding on paper-based materials.
- Identify the risks that sustained flooding and flash flooding pose to paper-based materials.
- Collect observational data over time, evaluate preservation strategies, and explain how the loss of records affects communities, historical research, and disaster recovery.

Teacher Notes

- Set up the soaking station where books can stay undisturbed for 24 hours and drying space for 48 hours.
- Have students choose and copy one sentence from a specific page in Step 1. It becomes their before-and-after legibility test.
- Grades 6–8: focus on the five important distinctions, especially observation vs. interpretation. Grades 9–12: add relative humidity, cellulose, and microbial growth to their observations.

Materials

- Used paperback books no longer appropriate for distribution (for example, books missing covers)
- Bowls, buckets, or containers big enough to submerge the books
- Bricks or soup cans to weigh down the books
- Room-temperature water
- Data journals (digital or paper)
- Paper-based archival primary sources, shown digitally or as printed copies: for example, farm and building records, ledgers of commodities, mortgages, bills of sale for personal property, family medical records, and marriage or birth

certificates

Lesson Outline

Warmup: Present primary archival materials (digital or paper copies), specifically examples of paper-based records found in 1920s Mississippi.

Intro/Mini Lesson:

1. During the Mississippi flood of 1927, farmers were among the communities most affected.
2. Flooding destroys not only structures, but the objects housed within them.
3. For this lesson, students examine ephemera (paper-based objects used in everyday life) of the 1920s farmer.
4. Ask: What kinds of paper documents might a farm family have kept? Examples include farm and building records such as ledgers of commodities, mortgages, bills of sale for personal property, and family medical records.

Activity: Small groups run a small-scale simulation of water damage to paper-based materials like those found in 1927 Mississippi.

5. **Step 1: Observe (Day 1).** Examine your paperback book and record its physical appearance, smell, and condition in your data journal. Be specific:
    a. What color are the pages?
    b. What do they feel like?
    c. Is the writing clear and legible?
    d. Choose a specific page and copy one sentence.
6. **Step 2: Flood (Day 1).** Submerge your book in water and weigh it down with a can, rock, or brick so it stays underwater for 24 hours.
7. **Step 3: Plan a salvage strategy (Days 1–2).** During the 24 hours, consider how you would try to save your book:
    a. How would you dry it?
    b. Now reconsider that technique as someone living in 1927 Mississippi. What resources would be available to you?
    c. Record your ideas in your data journal.
8. **Step 4: Remove and dry (Day 2).** Remove the book from the water and record your initial observations. Begin your chosen drying method and let it run for 48 hours. Check in periodically: Have you decided to make any adjustments?
9. **Step 5: Results (after 48 hours of drying).** Record the results of your method:
    a. What do the book's pages feel and smell like?
    b. Was the surface the book dried on affected or changed by the process?

c. Can you find your chosen page and read the sentence you copied?

Exit Ticket:

10. Each group shares its data journal and reflections on the process in a class discussion.
11. Close by returning to the “1926 Backpack” list: Which things could never truly be replaced?

Lesson 2: Can We Recover the Past?

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Time: about 5 days (Days 1–3 experiment; Days 4–5 interpretation and comparison)

Core driving question: What happens to history when documents are damaged by water, and can humans or AI recover the information?

Students explore how flood-damaged documents can be preserved and recovered using modern technologies, human interpretation, and AI. Through hands-on investigation, they consider how these methods help recover information, preserve historical records, and protect stories and knowledge for future generations.

Objectives

SWBAT:

- Explain how floods damage historical records and apply basic archival preservation concepts.
- Design and conduct controlled experiments.
- Practice metadata and documentation.
- Compare human interpretation with AI interpretation and evaluate the accuracy, bias, and limitations of AI.
- Reflect on whose histories survive disasters.

Teacher Notes

- **Groups:** 3–4 students per team. Each team acts as archivists, disaster scientists, historians, and later, AI investigators.
- **Let students design the variables themselves** (see the variable options below).
- **Important twist:** Do NOT give groups the original documents during the human interpretation round. This simulates real historical uncertainty.
- Students may create their own documents, use “historical style” materials, or use discarded books and newspapers.

Materials

- Paper types: notebook paper, printer paper, newspaper, cardstock, sticky notes, index cards, glossy magazine pages, book pages
- Writing tools: pencil, ballpoint pen, marker, gel pen, crayon, printed text
- Tubs, trays, or buckets; water; optional soil or sediment and salt

- Drying supplies: paper towels, heavy books or boards for pressing, a fan; freezer access for a teacher demo
- Camera or device to photograph documents
- AI and scanning tools (for example, OCR apps, ChatGPT image analysis, Google Lens, Adobe Scan, or handwriting recognition tools)
- Data journals and the Human vs. AI comparison chart

Possible Variables

Variable	Options
Time submerged	30 seconds, 5 minutes, 1 hour, overnight
Water type	Clean, muddy, salt, simulated polluted water
Water temperature	Cold, warm
Paper type	Notebook paper, printer paper, newspaper, cardstock, sticky notes, index cards, glossy magazine pages, book pages
Writing tool	Pencil, ballpoint pen, marker, gel pen, crayon, printer ink

Document types students can create: diary pages, letters, maps, grocery lists, scientific observations, newspaper articles, photographs, family recipes, school records, flood warnings, and "official" government forms. Creating their own documents builds emotional investment and mimics real archives.

Lesson Outline

Warmup: Ask: If your family's most important papers were underwater for a day, what information would you most want to recover? Who else might need that information?

Intro/Mini Lesson/Activity:

1. **Day 1: Create the archive.** Students create documents, photograph the originals, and record metadata for each: creator, date, material type, ink type, document purpose, and predicted survivability. This connects directly to archival science. Students then make predictions:
    - Which ink survives best?
    - Which paper survives best?
    - What kinds of information are easiest to recover?

    - Will AI outperform humans?

2. **Day 2: Flood event.** Using tubs, trays, or buckets, students submerge their documents, agitate the water slightly, optionally add sediment, and carefully record conditions. For extra realism, students can add crumpling, pressure, or partial burial in mud.
3. **Day 3: Preservation and drying.** Students test air drying, paper towels, pressing, and fan drying; freezing is a teacher demo. Introduce mold risk, fragility, and archival conservation. Students catalog what survived.
4. **Day 4: Human interpretation (Round 1, no AI).** Groups exchange damaged documents and try to reconstruct missing words, meaning, dates, authorship, and purpose. Students rate their confidence in each reconstruction. Do not provide the originals yet.
5. **Day 5: AI interpretation (Round 2) and comparison.** Students photograph the damaged documents and ask AI tools:
    - What does this document say?
    - Reconstruct the missing sections.
    - What type of document is this?
    - What was the author's intent?

- Then reveal the originals.
- Students compare the original document, the human interpretation, and the AI interpretation using the chart below.

Question	Human	AI
Accuracy		
Confidence		
Hallucinations		
Missed details		
Context understanding		
Bias / errors		

High-Level Discussion Questions

History and Archives	AI and Truth	Environmental Justice
What histories are lost after disasters? Which communities lose records most often? Why are archives important?	Did AI “invent” missing information? When should we trust AI reconstruction? Could AI accidentally rewrite history?	Who is most vulnerable to losing family records in floods? How do disasters erase cultural memory?

Exit Ticket: **Middle school:** lab sheet. **High school:** experimental design rationale.

Lesson 3: The Great Archive Rescue (Optional Extension)

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Time: Varies by activity

Driving question: Can we save history after the flood?

Students take on an advanced extension project to recover and preserve information from flood-damaged historical documents. Teachers choose from the activities below. Through these investigations, students explore how technology, critical thinking, and human perspectives work together to preserve history.

Objectives

SWBAT:

- Evaluate AI-generated reconstructions for accuracy and identify invented details.
- Use forensic tools to recover information from damaged records.
- Connect document loss to their own community through oral histories.

Activity Menu

1. **Compete Against AI.** Students score human accuracy, AI accuracy, and combined human + AI accuracy.
2. **"Fake Reconstruction" Exercise.** Intentionally give AI incomplete documents and see whether it confidently invents details. This emphasizes AI literacy.
3. **Forensic Recovery Station.** Students examine damaged documents using UV flashlights, magnifiers, angled lighting, and image contrast tools.
4. **Community Archive Connection.** Students interview relatives about documents lost in hurricanes or floods, create oral histories, and discuss digital backups.
5. **Closing Reveal.** Reveal the original documents, the actual text, and the AI reconstructions. Students are often surprised by how much humans infer, how confidently AI fabricates, and how fragile historical records really are. Connect this to the archives lost after Hurricane Katrina and the Great Mississippi Flood of 1927.

Deliverables and Exit Tickets

Middle School	High School
Prediction chart	Full lab report

Reflection paragraph “Best surviving document” award	Accuracy analysis AI ethics reflection
Sample research question: Which writing tool survives flooding best?	*Sample research question:* Does AI outperform humans at reconstructing water-damaged historical documents?

Assessment Ideas

Scientific Method	Historical Thinking	AI Literacy
Variables Controls Hypothesis Observations	Sourcing Interpretation Uncertainty	Verification Hallucinations Limitations

Vocabulary

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Includes Vocabulary, student-friendly definition, context for the experiment

For **Middle School Students**

Floodwater: Water that covers land that is normally dry. Floodwater can soak books, photographs, letters, government records, and other important documents.

Inundation: The covering of normally dry land or objects by water. The experiment simulates the inundation of paper materials during a flood.

Submersion: Being completely underwater. Students submerge a book for a set period to simulate severe flood exposure.

Absorption: The process of taking in a substance such as water. Paper fibers absorb water, causing pages to swell and weaken.

Saturation: The condition in which a material has absorbed as much water as it can hold. A book left underwater may become completely saturated.

Porosity: The amount of open space in a material that can hold or transmit water. Paper is porous, which allows water to enter spaces among its fibers.

Capillary action: The movement of water through small spaces, sometimes against gravity. Even if only the bottom of a document touches water, moisture can move upward through the paper.

Paper fiber: The tiny plant-based fibers, usually cellulose, that form paper. Water disrupts the connections among paper fibers, changing the strength and shape of a page.

Degradation: The process of a material breaking down or losing quality. Floodwater can cause physical, chemical, and biological degradation of documents.

Deterioration: A gradual decline in condition or quality. Students document deterioration by observing changes in texture, color, smell, strength, and readability.

Warping: Bending, twisting, or changing shape because of moisture or other forces. Pages often warp as wet books dry unevenly.

Delamination: The separation of materials that were originally bonded together in layers. Covers, photographs, labels, and coated papers may separate after becoming wet.

Contamination: The introduction of unwanted or potentially harmful substances. Real floodwater may contain mud, sewage, chemicals, oil, microorganisms, and other contaminants. Classroom water is much safer and simpler.

Mold: Fungi that can grow on damp organic materials. Wet paper provides conditions favorable for mold growth. Students should understand why flooded documents must be dried quickly.

Legibility: How easily writing or printing can be read. Students compare the legibility of the same sentence before flooding and after drying.

Preservation: Protecting an object or record from damage or further deterioration. Archivists use preservation techniques to reduce damage before disasters occur.

Conservation: Actions taken to stabilize or repair a damaged historical object. After a flood, specialists may conserve important books, photographs, maps, or documents.

Salvage: Recovering materials after they have been damaged or threatened. Students develop a salvage strategy for their flooded book.

Primary source: An original document, object, photograph, or other evidence created during the time being studied. Birth certificates, letters, newspapers, ledgers, photographs, and property records from 1927 can provide direct evidence about people's lives.

Archive: A collection of records preserved because they have continuing historical, legal, cultural, or personal value. Floods can damage entire archives, potentially destroying information about communities and individuals.

Ephemera: Everyday materials originally intended for short-term use but that may later become historically valuable. Tickets, receipts, advertisements, menus, flyers, postcards, and handwritten notes can reveal what everyday life was like.

Metadata: Information that describes a record, such as its creator, date, location, or subject. A damaged document might survive but become much less useful if its date, creator, or location is lost.

Provenance: The history of where a document or object came from and who created or owned it. Knowing that a letter belonged to a particular family can completely change how historians interpret it.

Context: The circumstances surrounding an event or source that help us understand its meaning. A damaged document may contain readable words but still be difficult to interpret if its historical context has been lost.

Evidence: Information used to support a conclusion or explanation. Students use observations from their experiment as evidence for claims about how flooding damages records.

Observation: Information collected directly using the senses or measuring tools. “The pages are curled and brown” is an observation; “the book is ruined” is an interpretation.

Qualitative data: Descriptive information rather than numerical measurements. Color, smell, texture, page condition, and readability are qualitative data students can record.

Quantitative data: Information expressed using numbers or measurements. Students might record soaking time, drying time, book mass, number of readable words, or number of damaged pages.

Resilience: The ability of a system or community to withstand, adapt to, and recover from disruption. Protecting records is part of community resilience because records may be needed to document property, identity, history, and recovery after a disaster.

For **High School Students**

Archival bias Gaps or imbalances in historical records caused by decisions about whose information was recorded, saved, collected, or preserved., After a disaster, some records may be saved while others are lost. Students can ask whether flood damage might make existing gaps in the historical record even larger—and whose stories are most likely to disappear.

Documentary record The collection of written, photographic, audio, digital, and other recorded evidence about people, places, and events., Letters, newspapers, photographs, property records, maps, and government reports together form part of the documentary record of the 1927 flood. Flood damage can permanently change that record.

Corroboration Checking information against other independent sources or evidence to see whether they support the same conclusion., If part of a flooded document becomes unreadable, historians might compare it with newspapers, photographs, maps, government records, or other documents to corroborate what they think it says.

Authenticity Evidence that an object or record is genuine and is what it claims to be., Historians and archivists need to determine whether a document is an original historical record, a copy, a later reproduction, or something that has been altered.

Chain of custody A documented history of who possessed, handled, moved, or cared for an object or record., When damaged records are recovered after a disaster, documenting where they were found and who handled them helps preserve information about their origin and authenticity.

Disaster mitigation Actions taken before or during a disaster to reduce damage and loss., Moving important records above expected flood levels, storing them in protective containers, making emergency plans, and creating digital copies can reduce losses when flooding occurs.

Relative humidity A measure of how much water vapor is in the air compared with the maximum amount the air could hold at that temperature., A flooded book can remain damp even after it is removed from water. High relative humidity slows drying and can create conditions favorable for mold and other microbial growth.

Cellulose The natural plant material that makes up much of the structure of paper., Most paper contains cellulose fibers derived from plants. Water can weaken the connections among these fibers, while microorganisms and chemical reactions can contribute to their deterioration.

Microbial growth The growth of microscopic organisms, including fungi and bacteria, under suitable environmental conditions., Wet paper, warmth, moisture, and organic material can create conditions for microbial growth. Mold is an especially important concern when recovering water-damaged books and documents.

Digital preservation The long-term protection and management of information in digital form so that it remains accessible in the future., Scanning a historic document can preserve its

information even if the original is later damaged, but digital preservation also requires maintaining files, metadata, backups, and usable file formats over time.

Standards Addressed in this Module

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Standards are grouped by state and grade band. Descriptions are short summaries; see each state's official document for full wording.

Science and engineering practices: planning and carrying out investigations; analyzing and interpreting data; constructing explanations; engaging in argument from evidence; obtaining, evaluating, and communicating information.

Crosscutting concepts: cause and effect; stability and change; systems and system models.

Louisiana: Science and Social Studies (2022)

Grade / Course	Standard	Focus (summary)
Middle school science	MS-ETS1-1	Define the criteria and constraints of a design problem
Middle school science	MS-ETS1-2	Evaluate competing design solutions using a systematic process
Science, Grade 8	MS-ESS3-2	Analyze data on natural hazards to forecast catastrophic events and inform mitigation
High school science	HS.ETS1B.a	When evaluating solutions, consider a range of constraints, including cost, safety, and reliability
Grade 8	8.12.g	Causes of the 1927 Great Mississippi River Flood and how the government response affected Louisianans
Grades 6–8	6.6 / 7.6 / 8.6	Use primary and secondary sources; includes explaining how the availability of sources affects historical interpretations
Grades 6–8	6.7 / 7.7 / 8.7	Construct claims supported by evidence
U.S. History	US.5	Use sources to evaluate claims, compare accounts, and explain how the availability of sources affects historical interpretations
U.S. History	US.6	Construct evidence-based claims; evaluate counterclaims
Civics	C.6 / C.7	Use sources to evaluate claims; construct evidence-based claims

Mississippi: Science (2018) and Social Studies (2022)

Grade / Course	Standard	Focus (summary)
Middle school science		Engineering design: test materials, analyze outcomes, and improve solutions
Grade 6	6.G.7.5	How people respond to natural hazards
Mississippi Studies	MS.1.4	How Mississippi's geographic features and processes, including the Great Flood of 1927, shaped its development
Introduction to Geography	ITG.11.2	Processes that produce environmental hazards

Arkansas: Science and Social Studies (2022)

Grade / Course	Code	Focus (summary)
Grade 7 Science	7-ETS1-1	Define design criteria and constraints, considering impacts on people and the environment
Grade 7 Science	7-ESS3-2	Analyze data on natural hazards to forecast events and inform mitigation technologies
Arkansas History (9–12)	H.5.ARH.5	Responses to natural disasters in Arkansas, including the Flood of 1927

Common Core State Standards: Literacy in Science and History, Writing, Speaking and Listening

Grade band	Code	Focus (summary)
6–8	RST.6-8.3	Follow a multistep procedure when carrying out experiments and taking measurements
6–8	RH.6-8.1	Cite textual evidence to support analysis of primary and secondary sources
6–8	WHST.6-8.2	Write informative/explanatory texts

6–8	SL.6.1 / SL.7.1 / SL.8.1	Engage in collaborative discussions
9–10	RST.9-10.3	Follow a complex multistep procedure, attending to special cases or exceptions
9–10	RH.9-10.8	Assess how well reasoning and evidence support an author's claims
11–12	RST.11-12.3	Follow a complex multistep procedure and analyze specific results
11–12	RH.11-12.8	Evaluate premises, claims, and evidence by corroborating or challenging them with other information
9–12	WHST.9-10.2 / WHST.11-12.2	Write informative/explanatory texts, including technical processes
9–12	WHST.9-10.7 / WHST.11-12.7	Conduct short research projects to answer a question
9–12	SL.9-10.1 / SL.11-12.1	Initiate and participate in collaborative discussions