Forecasting the Flood: Isaac Cline, Data, Warnings, and Who Controls Information

Central Question: What good is an accurate scientific warning if the public never receives it?

Supporting Questions

- What evidence allowed Isaac Cline to recognize the danger of the 1927 flood?
- How did meteorologists forecast floods before satellites, radar, and computer models?
- Who controlled whether scientific warnings reached the public?
- How should scientists communicate risk when certainty is impossible?
- What happens when economic interests and public safety come into conflict?

Learning objectives

By the end of Forecasting the Flood: Isaac Cline, Data, Warnings, and Who Controls Information, students will be able to:

1. Explain how Isaac Cline and the U.S. Weather Bureau used rainfall, river-stage, geographic, and upstream observations to forecast flood conditions before modern radar, satellites, and computer models.
2. Analyze and graph historical rainfall and river-stage data to identify patterns associated with increasing flood risk.
3. Use weather and river data to develop an evidence-based flood forecast and communicate the degree of uncertainty associated with that forecast.
4. Distinguish between a scientific forecast and effective risk communication, explaining why accurate scientific information does not automatically result in public action.
5. Analyze primary sources—including Weather Bureau bulletins, maps, and newspaper reports—to determine how scientific information changed as it moved from forecasters to journalists, editors, and the public.
6. Evaluate how economic, institutional, and political interests can influence the communication of environmental risk.

7. Corroborate scientific data and archival sources to construct an evidence-based explanation of what people could reasonably have known about flood risk before the most catastrophic events of April 1927.
8. Compare historical flood forecasting with modern natural-hazard prediction and identify both technological advances and continuing challenges associated with uncertainty and public warning.

Louisiana standards

Middle school science

7-MS-ESS2-5 — Earth's Systems: Students collect data as evidence for how interactions of air masses produce changing weather conditions. Louisiana specifically emphasizes the use of weather data and the fact that weather predictions are probabilistic. That fits the rainfall analysis and the "You Are the Weather Bureau" forecasting exercise extremely well.

MS-ESS3-2 — Earth and Human Activity, Grade 8: Analyze and interpret natural-hazard data to forecast catastrophic events and inform technologies that mitigate their effects. Louisiana specifically lists floods and severe weather among the relevant hazards and emphasizes using graphs, charts, images, locations, magnitudes, and frequencies to identify patterns. This is probably the single strongest science standard for the lesson.

Louisiana Grade 8 social studies

8.4 — Use geographic representations and historical data to analyze U.S. historical developments, including environmental, economic, political, and cultural characteristics. Students do exactly this when they combine rainfall, river-stage, watershed, and flood maps.

8.6 — Use primary and secondary sources to analyze content, evaluate claims and evidence, compare multiple accounts, and consider how available sources affect historical interpretation. Cline's bulletins versus newspaper coverage are an almost ideal application.

8.7 — Construct claims supported by evidence and reasoning, including analyzing causes/effects and evaluating counterclaims. This aligns with students deciding whether a warning was justified and defending whether newspapers should publish it.

8.12(c) — Explain how advances in transportation, technology, and media changed American society during the early twentieth century. Telegraph, telephone, radio, newspapers, and Weather Bureau communication systems fit naturally here.

8.12(g) — Describe the causes of the Great Mississippi River Flood of 1927 and explain how the disaster and government response affected Louisianans. This is a direct content alignment, not merely a thematic one.

Louisiana high school

For high school, here are the statewide source-analysis practices:

9–12.SP1 — Examine sources for origin, point of view, intended audience, reliability, and content-specific language.

9–12.SP2 — Analyze primary and secondary sources, evaluate claims and evidence, compare accounts, and explain how source availability affects historical interpretation.

9–12.SP3 — Construct evidence-supported claims, analyze cause and effect, compare viewpoints, and evaluate counterclaims.

For Environmental/Earth Science:

HS-ESS3-1 — Construct an evidence-based explanation for how natural hazards influence human activity. Louisiana explicitly identifies floods and severe weather as natural hazards that have affected populations and migration.

Mississippi standards

Grade 7 science

E.7.9A — Understand how patterns and movements of air and water influence weather.

Especially useful are:

E.7.9A.1 — Analyze and interpret weather patterns.

E.7.9A.2 — Analyze evidence explaining weather conditions.

E.7.9A.3 — Interpret atmospheric data and weather maps to predict weather conditions.

The historical aspect actually makes E.7.9A.3 interesting: students can ask, “What could Cline predict without the satellite and radar data named in today's standard?”

Grade 8 science

E.8.9B — Understand natural hazards and construct explanations for why some hazards are predictable and others are not.

More specifically:

E.8.9B.1 — Research and map natural hazards to determine their impacts on society.

E.8.9B.2 — Compare technologies used to predict natural hazards.

E.8.9B.3 — Develop mechanisms to improve community resilience against natural hazards, explicitly including flood zones and watershed management.

E.8.9B.2 is especially good for Cline. Students can compare his 1927 toolkit—

rain gauges + river gauges + telegraph + maps + human observations

with today's— radar + satellites + automated gauges + numerical models + cell-phone alerts.

That could become a small extension activity.

Mississippi social studies

Mississippi Studies

MS.1.4 is an unusually direct fit. Students must explain how Mississippi's geographic features and processes contribute to social, technological, and economic development; the standard explicitly names the Mississippi River, the Delta, and the Great Flood of 1927 as examples.

This lesson lets students examine the Great Flood not simply as a historical event but as the interaction of: geography + weather + river system + technology + communication + human decisions.

High school U.S. History: 1877 to Present

USH 5 — 1920s–1930s, particularly USH 5.1, asks students to analyze the impact of radio, cinema, and print media on American mass culture. The Cline lesson gives this a particularly interesting disaster-information application by examining newspapers and emerging radio as competing ways of communicating risk.

Consider treating that as a supporting, rather than primary, alignment because the standard focuses broadly on mass culture rather than disaster reporting.

The core standards:

State	Level	Core Standard	Why it fits
Louisiana	Grade 7 Science	7-MS-ESS2-5	Analyze weather evidence and probabilistic prediction
Louisiana	Grade 8 Science	MS-ESS3-2	Use natural-hazard data to forecast catastrophic events
Louisiana	Grade 8 Social Studies	8.4, 8.6, 8.7	Historical data, primary sources, evidence-based claims
Louisiana	Grade 8 Social Studies	8.12(g)	Directly addresses the Great Flood of 1927
Mississippi	Grade 7 Science	E.7.9A.1–3	Analyze weather evidence and make predictions
Mississippi	Grade 8 Science	E.8.9B.1–3	Natural hazards, forecasting technology, resilience
Mississippi	Mississippi Studies	MS.1.4	Directly identifies the Great Flood of 1927
High School	LA Science	HS-ESS3-1	Natural hazards and human activity
High School	LA Social Studies	9–12.SP1–3	Source evaluation, corroboration, claims and evidence

Overview

Isaac Monroe Cline was one of the most experienced weather forecasters in the United States when the Mississippi River began rising in 1927. He had already lived through catastrophe. As head of the Weather Bureau office in Galveston, Texas, Cline survived the devastating hurricane of 1900, during which his wife died. He moved to New Orleans in 1901 and subsequently developed expertise in tropical storms and Mississippi River flood forecasting. In 1903 he issued a major flood warning despite pressure from Weather Bureau superiors to withdraw it; in 1915 he played an important role in warning Louisiana residents of an approaching hurricane. By 1927, he was the senior Weather Bureau meteorologist in New Orleans.

It is important to note that Cline did not have radar and he did not have satellite imagery. Nor did he did have a computer model. He had: rainfall measurements, river gauges, reports from upstream stations, telegraph and telephone communications, maps, knowledge of tributaries, previous flood records, and decades of experience. From those pieces of evidence, he attempted to determine not only how high the Mississippi would rise, but where floodwater would move after levees failed.

The Louisiana State Museum's Isaac Monroe Cline Collection preserves a remarkably complete series of his 1927 flood-warning bulletins and maps. The surviving collection begins with warnings dated March 23, April 8, and April 14, followed by a Weather Bureau River Forecast and Flood Warning on April 23 and a Special Flood Bulletin on April 29. In May, Cline began issuing warnings repeatedly—sometimes more than once in a single day.

Archive Items needed: Cline's March 23 bulletin, April 14 bulletin, the April 14 *New Orleans Item* coverage, the May 1 special bulletin, and a small rainfall/river-stage dataset. The Louisiana State Museum finding aid confirms that the original bulletin sequence survives and is open for research.

PART I — Meet Isaac Cline

Give students only a short biography initially.

Isaac Cline, 1927

Age: 65

Position: Senior Weather Bureau forecaster in New Orleans

Experience: More than four decades of weather observation and forecasting

Specialties: Hurricanes, tropical weather, river flooding

Major previous experiences: Galveston Hurricane, 1900; Mississippi River flood forecasting, 1903; Mississippi Valley floods, 1912; New Orleans hurricane, 1915; *Tropical Cyclones*, published 1926. The National Weather Service notes that Cline often developed flood forecasts using precipitation and stream-flow data and sometimes issued forecasts independently of Washington's preferred procedures.

Ask Students: Does long experience make a scientist more reliable—or can experience also make someone overconfident?

Teachers: Do not resolve this question. Students should keep it in mind throughout the lesson.

PART II — Forecast the Flood Before Meeting Cline

This is where I would begin the investigation. Do **not** first tell students what Cline predicted. Give them rainfall data.

Data Investigation 1 — The Basin Is Filling

Provide students with rainfall observations from several parts of the Mississippi watershed during late 1926 and early 1927. One particularly important storm occurred April 12–16, 1927. Federal meteorological analysis later found rainfall approaching 12 inches in north-central Arkansas and about 9.6 inches in central Louisiana. Importantly, rainfall during March and early April had already been far above normal, leaving soils wet and rivers high before this storm arrived.

Ask students to calculate:

A. Cumulative Rainfall

Instead of looking at individual storm totals, calculate: 7-day total, 30-day total, 60-day total.

Now ask: Which tells you more about flood potential: yesterday's rain or the rainfall accumulated over the previous two months?

B. Make a Cumulative Rainfall Graph

Put date on the x-axis and total accumulated rainfall on the y-axis. Students should see the curve climbing rather than repeatedly returning to zero.

Ask: What does a cumulative graph show that a daily rainfall graph hides?

C. Map the Rain

Give students a Mississippi watershed map and rainfall measurements from: Cairo, Memphis, Greenville, Little Rock / Arkansas basin, Vicksburg, central Louisiana, and New Orleans. Have students represent rainfall with proportional circles or graduated symbols.

Then ask: Why is rainfall in Arkansas or Illinois relevant to someone living in Louisiana?

The answer should lead back to watershed → tributaries → Mississippi → downstream flood wave.

PART III — You Are the Weather Bureau

Tell students: It is April 8, 1927. They have rainfall and river-stage data but do not know what ultimately happens. Ask them to issue one of four statements:

NORMAL CONDITIONS - No unusual action needed.

WATCH - Conditions are unusual. Continue monitoring.

WARNING - Flooding is likely. Begin preparations.

EMERGENCY WARNING - Serious flooding is likely. Begin immediate protective action.

Then require: Give three pieces of evidence supporting your decision.

And: What evidence would make you change your warning?

PART IV — Reveal Cline's Bulletins

Now introduce the archival record. The Louisiana State Museum preserves Cline's original warning sequence:

March 23 — Flood Warning Bulletin

April 8 — Flood Warning Bulletin

April 14 — Flood Warning Bulletin

April 23 — River Forecast and Flood Warning

April 29 — Special Flood Bulletin

Then an increasingly frequent series beginning: May 1, May 4, May 7, May 10, May 11, May 12, May 13 …and continuing through the flood, sometimes with two bulletins on the same day.

Ask: What does the increasing frequency of bulletins tell you? Students may recognize that scientific communication itself can be evidence of escalating risk.

PART V — The Warning Nobody Wanted

Here the lesson becomes much more than meteorology. By early April, Cline was issuing flood bulletins. But the New Orleans newspapers were not consistently publishing them. The Louisiana State Museum finding aid states directly that Cline attempted to get his warnings into local newspapers, but the papers initially refused

because of concerns about bad publicity and panic. Later accounts provide additional detail.

On April 14, Cline summoned newspaper reporters to his office and demanded to know why his warnings were not appearing. The reporters told him: They were writing the stories, but their editors were not printing them. The suppression was connected to influential local interests concerned that frightening flood reports would damage New Orleans commerce and confidence. Cline responded that even if the press could be controlled, the Weather Bureau still had other communication channels—including mail, telegraph, telephone, and radio.

This distinction is important: The reporters were not necessarily refusing to report the flood. Their reporting was being blocked higher in the information system.

PART VI — Follow the Information

Put this on the board or large Post-it notes:

SCIENTIFIC OBSERVATION

↓

WEATHER BUREAU

↓

CLINE'S FORECAST

↓

REPORTER

↓

EDITOR

↓

PUBLISHER

↓

PUBLIC

Then ask students to identify: Where can information be stopped?

Then add business leaders, Government officials, levee boards, radio, telephone, telegraph, and mail. Ask the students to draw additional arrows. The lesson becomes an information system.

PART VII — April 14: Science Versus Commerce

After Cline protested, the New Orleans Item published a story on April 14 under the headline: “Heavy Rains Raise River; Weather Bureau Advises of Rising Stages”

The story conveyed the Weather Bureau's recommendation that people take precautions against still higher river stages during the following two weeks. Barry's source notes identify the April 14 *New Orleans Item* as the publication carrying this report.

The timing is extraordinary. The next day was Good Friday, April 15. A tremendous storm then struck the region.

Ask the students: Imagine you read the April 14 newspaper. Would you do nothing**,** monitor the river**,** move belongings**,** prepare to evacuate**,** leave immediately

What language in a scientific warning would convince you?

PART VIII — Forecast Versus Headline

This is an archive station.

Give students:

Document A: Cline's April 14 Weather Bureau warning.

Document B: The newspaper account.

Students will highlight language retained, language softened, and language omitted

Then ask: Does the newspaper communicate the same level of danger as the scientist?

This teaches students that information can change between source and publication.

PART IX — An Important Complication: Cline Was Not Always Alarmed

We don’t want the lesson to become a simple “scientist hero versus corrupt newspapers” narrative. Cline believed the lower Mississippi was facing an extraordinary flood. But he did not believe New Orleans itself was likely to be overtopped by the Mississippi. He expected levee failures upstream to release enough water to reduce the

river's pressure before the flood crest reached the city. On April 24, he publicly characterized the possibility of danger to New Orleans as remote, assuming appropriate precautions continued. That gives students a very good question: Can a forecast be correct at one geographic scale and still be misunderstood at another? Cline was essentially saying: The flood is extremely dangerous, and simultaneously: I do not think New Orleans itself will be inundated by Mississippi River overflow. Those are not contradictory statements.

PART X — Forecasting Where Water Goes After a Levee Break

Cline's work became even more remarkable after levees began failing. Once water left the river channel, forecasting became much harder. Now a forecaster had to consider land elevation, railroad embankments, natural ridges, forests, roads, bayous, levees, drainage channels, and previous crevasses. Cline gathered information about these landscape features and attempted to estimate how floodwater would move across the land.

Later accounts describe railroads providing information and Cline developing estimates of flood movement that became important to Herbert Hoover's relief operations. Hoover's organization used forecasts to prepare camps and rescue operations before water reached communities.

Student Challenge

Give students a simplified elevation map (Elevation RR map). Mark a levee break. Ask: Where will the water be 24 hours later? Then add railroad embankment. Ask again. Where will the water be 24 hours later? Then add a bayou. Ask again. Where will the water be 24 hours later? Then add another levee. Ask again. Where will the water be 24 hours later? Students discover that forecasting a flood is not just forecasting the river. It is forecasting the **landscape**.

PART XI — Rainfall Analysis Options

I would offer three levels.

Middle School — Pattern Recognition

Students graph daily rainfall. Ask: When were the wettest periods? Did the ground have time to dry? Which locations received heavy rain? What happens when rain falls throughout a watershed? For this lesson, no statistics are necessary.

High School — Cumulative Rainfall + Lag

Students calculate: 7-day rainfall, 30-day rainfall, and cumulative seasonal rainfall. Then graph river stage. Ask them to determine: How long after heavy upstream rainfall does river stage respond downstream? Now introduce lag time.

Lag time is the delay between a cause—such as heavy rainfall—and a downstream response.

This is exactly the kind of thinking Cline had to do.

PART XII — Forecast Skill

A particularly good analysis would compare: PREDICTED STAGE with OBSERVED STAGE. Students calculate: Forecast Error = Observed Stage − Predicted Stage.

Then ask: Should a forecaster be judged only by numerical accuracy?

Now add: Was the warning early enough to act? Was the geographic area correct? Was the warning understandable? Did people receive it? Suddenly students realize that an excellent forecast can still fail as risk communication.

PART XIII — Archive Investigation: Where Are Cline's Records?

Cline's 1927 material survives in several archival locations.

Louisiana State Museum Historical Center

The **Isaac Monroe Cline Collection, RG 54**, contains ten folders documenting March–August 1927, including flood warnings, special bulletins, and maps. Cline himself donated the materials to the museum in 1931.

Tulane University

Barry's research notes identify **"Official Stage Forecasts 1927"** in Tulane's Louisiana Collection as a primary source used in *Rising Tide*.

Herbert Hoover Presidential Library

Hoover's papers contain Weather Bureau material including Cline correspondence, reports, and special flood bulletins from 1927.

U.S. Weather Bureau

Cline also contributed to the federal publication *The Floods of 1927 in the Mississippi Basin*, issued as a supplement to the *Monthly Weather Review*.

Ask Students: Why might the same scientific event produce records in a museum, university archive, presidential library, newspaper archive, and federal government publication? That is a wonderful archival question.

PART XIV — The Scientist Becomes Part of the Archive

There is one final archival twist. After the flood, Cline became part of the historical record he helped create. He preserved his bulletins, and then he donated them. He later wrote an autobiography. Organizations praised him and newspapers retrospectively celebrated his work. The **New Orleans Item-Tribune** published a July 3 article calling him the flood's “Unsung Hero,” and organizations later presented him awards for his service. The Louisiana State Museum still holds a presentation cup thanking him for his work during the flood.

Ask: If Cline helped determine which of his own records entered the archive, how should that affect the way historians use them?

Culminating Activity

Issue the Warning

Students are the New Orleans Weather Bureau on April 14, 1927. Give them rainfall data, river-stage data, upstream reports, map, previous flood stage. They must produce a bulletin of no more than 75 words. It must include what we know, what we expect, what we don’t know, and what people should do.

Then announce: Your bulletin has reached the newspaper. But the publisher says: this warning could frighten visitors, damage commerce, cause people to withdraw money, and create unnecessary panic. We need stronger evidence before publication.

Students now have two minutes to decide whether to soften it, delay it, publish it, or bypass the newspaper.

If they choose to bypass it, they must choose either radio, telephone, telegraph, mail, or public posting. Then they need to defend the decision.

Debrief

Ask: Who is responsible for a warning reaching the public—the scientist, the journalist, the publisher, the government, or all of them?

Then: Is causing unnecessary alarm worse than failing to warn people about a real danger?

And finally: At what point does controlling information become part of the disaster itself?

Exit Ticket

Choose one:

Option 1: Cline had scientific information about the approaching flood, but information alone did not protect people. What else had to happen before that information could save lives?

Option 2: Was the conflict over Cline's warnings primarily a scientific problem, a communication problem, or a power problem? Defend your answer with evidence.

Option 3: If you were a newspaper editor in April 1927, what level of uncertainty would you accept before publishing a flood warning that might cause economic disruption or panic? Explain.

Central Takeaway

Forecasting a disaster and communicating a disaster are different problems. Isaac Cline could measure rain, read river gauges, estimate flood stages, and predict where water might travel. But a forecast only becomes a warning when someone communicates it. And a warning only protects people when they receive it, understand it, trust it, and have the ability to act.