

Rubric Revised May 15, 2002

4. Did you try out this lesson with students? If yes, please tell something about the class and students with whom you tried this.	No
5. Synopsis. Briefly, what is this lesson about?	Tracking hurricane Floyd, learning how hurricanes are classified, and thinking about how much damage this hurricane might have caused.
6. How long did it take you to download, print, and complete this lesson?	Two hours
7. Overall recommendation to VISIT program. Taking into account all factors below, I recommend that this lesson be included in the VISIT program as a resource for teachers.	3 With the following kinds of modifications or improvements: Improvements are needed in the way the agricultural statistics are handled, the process of demonstrating the classification system should be streamlined, and the life-cycle of hurricanes should be made part of the lesson so that the effects on the different states can be understood better.
Quality of Lessons	
➤ Pedagogically effective (i.e. person using the lesson is likely to learn what the lesson is intending to teach).	5 Please explain rating. The meanings of the statistics need to be better explained, the terminology tightened up, and the hurricane classification system clarified.
➤ Purpose and learning objectives are clear.	7 Please explain rating. The “purpose” emphasizes understanding of hurricane classification and tracking, while the lesson itself emphasizes estimating the effects of a hurricane. The “objectives” are better matched to the lesson, in that they place emphasis on use of demographic statistics.
➤ Lesson states what materials are needed to do the lesson (e.g. what data files, software, documents, URLs).	8 Please explain rating. No real problem here; the lesson only requires ArcVoyager and the data supplied with the lesson, but this is not explicitly stated in the lesson.

<p>➤ Provides scientific value and content accuracy</p>	<p>3</p>	<p>Please explain rating. I see some problems that could be addressed simply to the lesson’s benefit: Scientific value – 1. There is really no explanation of the conditions under which hurricanes form or die. (The student is asked if and why the hurricane lost or gained speed, but the lesson gives no guidance as to likely reasons.) Seeing the track provides a perfect opportunity for this teaching. 2. Additionally, the student is twice asked “how fast was it going (wind speed)” and later “did the hurricane lose or gain speed”. This creates confusion about the proper terms to use. “How fast was it going” and “...lose or gain speed” seem to address the storm’s speed along its track, which is important in estimating storm surge and damage, yet not calculated anywhere in the lesson. But the student is expected to find <u>wind</u> speeds each time the <u>storm</u>’s speed is mentioned.</p> <p>Content accuracy - There are some problems in the use of statistics and terms. 1. The student is asked how many “crops per acre” were in danger of being lost, but the data table actually gives crop-acres (acres devoted to crops as opposed to pastures, etc) 2. The question of how much money could have been lost from the damage in farmland is not answered. The table seems to show average sales per farm for each state, so viewing the column statistics will not give total farm sales at risk, but only a sum of the average farm sales of these states.</p>
<p>➤ Language, grammar and spelling are accurate.</p>	<p>8</p>	<p>Please explain rating. Nitpicking... Page 1 -- change “phenomena” to “phenomenon” Page 4 #11 – I would change to “You must order the pictures so that they stack correctly.” Worksheet q.10 – Hurricane is mistakenly capitalized.</p>
<p>➤ Instructions and procedures are complete, understandable and accurate.</p>	<p>9</p>	<p>Please explain rating. Very clear and concise.</p>

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➤ High quality of visual representations (e.g. layout sensible; screen shots readable; appropriate graph)	9	Please explain rating. Fine. I would only add a screenshot of the column statistics display.
➤ Appropriate to curriculum, grade level of your interest.	8	Please explain rating. The lesson has real potential for our Earth Science classes. I would beef up the science content a bit. Specifically, I would want the students to explain the conditions that cause storm surges and cause hurricanes to strengthen or weaken.
➤ Technical soundness (i.e., the technology works as stated).	10	Please explain rating. The author handled the technical explanations very well.
➤ Cartographic soundness (e.g. the maps include basic requirements and accuracy).	10	Please explain rating. Good maps and graphics for this lesson.

The Investigation or lesson(s) is effective for a teacher's professional development.		
➤ Uses and expands teacher's scientific knowledge	5	Please explain rating. It really seems aimed at the student. The teacher is assumed to be able to augment the lesson's science content, I think.
➤ Expands teacher's use of technology professionally and in the classroom	8	Please explain rating. The lesson's excellent step-by-step demonstration of the software's capabilities could be very helpful to teachers.
➤ Expands teacher's understanding and skills in spatial reasoning	5	Please explain rating. I assume that most teachers using this lesson would already be adept at understanding this sort of representation.
➤ Encourages collaboration with other teachers, scientists and technologists	5	Please explain rating. To the extent that the teacher learns more about ArcVoyager, this could be the case. The lesson isn't aimed at this, though.

<p>➤ Appropriate for a teacher’s own learning (convenience, efficient use of time, technically accessible, etc)</p>	<p>2</p>	<p>Please explain rating. As a training tool for ArcVoyager, this is good. But, as explained above, I think the science and statistics need some work before a teacher could use this for their own science learning.</p>
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<p>The Investigation or lesson(s) is effective for the students who use or might use the lesson.</p>		
<p>➤ Lesson addresses standards</p> <p>Identify which standards: Massachusetts Earth and Space Science Grade 9-10 Learning Standard 1.10 – “Describe the various conditions associated with frontal boundaries and cyclonic storms (e.g., thunderstorms, winter storms [nor’easters], hurricanes, and tornadoes) and their impact on human affairs, including storm preparations.”</p>	<p>8</p>	<p>Please explain rating. This lesson addresses the impact of hurricanes on human affairs, and could also be modified to address the conditions associated with hurricanes.</p>
<p>➤ Student participates in and learns about inquiry processes and methods</p>	<p>5</p>	<p>Please explain rating. The student is encouraged to think about hurricane damage, but with more information about the table data the student might be able to create their own damage estimations. The student is also asked to discover the classification system for hurricanes.</p>
<p>➤ Student develops or applies spatial reasoning in analysis of data</p>	<p>7</p>	<p>Please explain rating. I think if the legends and map symbols were customized more by the student, the students’ involvement with and “ownership” of the map could be heightened.</p>
<p>➤ Student learns about science applications relevant to community issues</p>	<p>8</p>	<p>Please explain rating. I think the student can get an idea of how storm damage predictions are made, and how satellite storm tracking is needed for this.</p>
<p>➤ Student becomes familiar with technology applications that are pedagogically and scientifically appropriate to the content or skill objectives</p>	<p>9</p>	<p>Please explain rating. I imagine that this exercise would get students thinking about the possibilities of mixing statistics and maps, and that they would feel comfortable working with ArcVoyager.</p>

<p>The Investigation Themes. Describe the theme or topic on which the investigation will be developed.</p> <p>(Example of themes: water quality in rivers or lakes; hazardous materials in living environments; ozone or radon in urban areas; distribution of flora or fauna; ecological modeling)</p> <p>Theme: Tracking a hurricane and predicting its impact.</p>		
<p>➤ Theme is interesting to the teacher who develops and implements the lessons.</p>	8	<p>Please explain rating. I think the subject is intrinsically interesting, but perhaps the lesson could provide more background information for teachers.</p>
<p>➤ Theme is interesting to the student who uses the lessons and becomes actively involved.</p>	7	<p>Please explain rating. I think students will want to know more specifics of this storm to compare with the estimates they make from the table data (e.g. how much damage actually resulted, wave and storm surge heights.) Perhaps excerpts from news accounts could be provided also.</p>

<p>The Investigation Scenario. The investigation scenario is the particular real world environment under study. It defines the geographical footprint for the Investigation. Local scenarios are usually more desirable because they are more relevant to the teachers, students and people in the surrounding community.</p> <p>Example of scenarios:</p> <p style="padding-left: 40px;">water quality in the local watershed; power shortage across a state; a city wide environmental problem; water resources across a state or region – location, adequacy, preservation</p> <p>What is the Scenario?</p> <p>Hurricane damage on the East coast. (Not local for many students, but this is an important Earth Science topic none the less.)</p>		
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Data: sources, availability, understandability		
➤ Lesson defines the data for an investigation.	N/A	Please explain rating
➤ Lesson provides the data	10	Please explain rating. The data is provided with the lesson.
➤ Lesson teaches how to get the data.	1	Please explain rating. We aren't told where the data came from.
➤ Lesson explains how to download and manage the data files on your computer.	1	Please explain rating. Not applicable in this lesson, but instructions on getting other hurricane tracks would be nice.
➤ Data are at the appropriate scale and coverage for the problem being investigated.	7	Please explain rating. The data provided is good, but I think the damage estimating might work better with a focus on selected counties rather than states. For example, it seems that most of New York state was at little risk, but perhaps Long Island was at great risk.
➤ Lesson provides metadata for the data in the lesson(s). Includes definitions of terms, sources of data, dates, etc. in a form students can access and understand.	2	Please explain rating. The state demographic data elements "Crop_acr87", "Ave_sale87" in particular need explaining. I think that the author may have misunderstood the data here, and that questions 5 and 6 are not really answerable by the student as a result.
<p>Please identify the types of data provided with the lesson:</p> <ul style="list-style-type: none"> ➤ A printed table of data on Hurricane Floyd's position and strength over its 10-day life. ➤ A series of satellite photos of Floyd as it crosses the Atlantic and travels up the coast. ➤ An "affected states" theme with demographic and other data in its theme table. ➤ A "Floyd" theme, which maps Floyd's track and also includes the above printed table's data. ➤ A series of themes which are subsets of the Floyd theme. Each subset shows Floyd's positions while it has a particular classification (tropical storm, class 1 hurricane, etc.). 		

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The Scientific and Technological Knowledge

➤ Lesson identifies the specific scientific, geographic or social knowledge base needed.	2	I think that not much specific knowledge of hurricanes is expected of the student going into the lesson, but this isn't stated. The student is asked, though, why the hurricane lost speed, and the answer would have to be based on background knowledge, I think.
➤ Lesson identifies resource scientists and specialists.	1	This would be a help to teachers, too.
➤ Lesson provides links to needed resources and a URL is provided for a glossary	1	This also would be helpful to teachers.
➤ The lesson or investigation resources help to formulate, understand, and/or use a Driving Question for inquiry.	5	The lesson seems divided between using table data to estimate possible damage and teaching the classification system. The classification system is a cut-and-dried thing, but the damage estimation problem could provide a neat reason for the student to learn about how and why a hurricane loses strength over land.
➤ It is clear what the driving question(s) are.	3	The dual focus dilutes the lesson's impact.

Driving Question:

I would propose this: How much damage might a hurricane cause, and where will it be worst?

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Tools and Methods		
➤ The analysis methods are appropriate to the purpose of the investigation and worth learning and doing	5	I think analyzing the state data tables is great. I think the classification teaching isn't compelling without more focus on how and why the storm strengthens and finally dies.
➤ Suggested tools are highly appropriate and useful for the analysis and interpretation tasks	8	This lesson makes excellent use of ArcVoyager.
Please identify tools used: ArcVoyager		
Tools for analysis: Teachers are provided with instruction in their use.	8	This is built into the lesson. Since the instructions are a bit exacting, the teacher would do well to practice the lesson first. Again, meta-data for the tables would be helpful.
Tools are accessible to teacher	8	See above.
Tools are accessible to the students	8	See above.
Expected outcomes from the analysis are defined clearly and completely.	8	The lesson objectives handle this well.

Assessment and Classroom Management		
➤ Provides useful advice on classroom management.	1	None given, but probably not much out of the ordinary would be needed.
➤ Provides rubrics or other instruments for assessing learning.	8	Student worksheet provided.

Classroom and curriculum feasibility:

Time: 1.5 hours, due to the complications of using ArcVoyager even with the author’s good instructions.

Materials: ArcVoyager and the data.

Logistics: No complications seen.

Management: As the lesson stands, I would suggest a discussion between the damage estimation part and the classification part, as a way to keep students in sync.

Demands on teacher: Familiarity with the lesson beforehand, and with ArcVoyager.

Teacher/Student skill prerequisites: Familiarity with Windows is a must. Some basic math skills are needed to understand the statistical items.

What are some other feasibility issues for this resource or lesson(s)?

Completing, Testing, Reporting and Continuing		
The lesson (or an extension of this lesson) results in a product	3	The worksheet is the only product. I might suggest a screenshot of Floyd’s track with a student-created legend showing its classification.
The outcome of the lesson or investigation is useful to a real audience.	6	I think that better use of the statistics and more teaching about the hurricane’s “life cycle” would help.
Results can be disseminated through science fairs, poster presentations, or publications such as the Community Atlas.	2	The scale of the lesson doesn’t warrant this. (Not a criticism; it’s just not that sort of project.)

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Project can be sustained through Grant Sources and Partnership opportunities at the Local, Regional and National Level	2	See above comment.
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Additional Comments Not Covered:

The author does a great job of walking the student through the steps of using the software, making the lesson an excellent introduction to ArcVoyager's power. As an Earth Science lesson, I think it has a lot of potential. A more unified focus or theme running through the lesson could make this a really compelling exercise.

THANK YOU!

ⁱ This rubric was developed by Beverly Hunter with support of the VISIT project under a grant from the National Science Foundation Teacher Enhancement program. It was tested and revised with the help of VISIT teachers.