



Surface Process Hazards Unit 5: Hazard mapping exercise

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You have been provided with a variety of datasets for the Boulder Creek, Colorado watershed and a blank map of the area. Based on your knowledge of mass wasting and the work you've done so far on other study areas, your task is to construct a hazard map for the Boulder Creek area.

How to start thinking about this:

- Evaluate multiple Boulder Creek datasets and the supplemental online resources provided in crafting your map.
- There are a variety of questions to get you started in thinking about your hazard map, but you can (and should) consider additional information.
- There are a variety of online resources provided about how other areas have prepared for mass wasting events. You should consult these and use them to prepare for your written report.

Part 1: What you need to do to map the hazard map

- Construct a color scale to indicate areas of high, medium, and low mass wasting hazards on your map.
- You must provide **specific evidence** for your choices in designating areas on the map as high, medium, and low mass wasting hazards. In other words, which datasets did you use to designate a particular area as high, medium, or low mass wasting potential? What did you observe in each dataset that was significant in making your decision? Use the table (attached) for your justifications.

Part 2: What to do after you finish your hazard map

Prepare a ~2-page report including the following:

- Summary of your map interpretation, including the factors that contribute to mass wasting potential in the Boulder Creek area.
- After you have made your mass wasting potential map, identify the areas on the map where the greatest risk is posed to humans and infrastructure AND explain what the risks might be.
- Evidence from the data to support your map interpretation.
- Specific suggestions on steps that municipalities and people living in the area might prepare for future mass wasting events in the area, using planning techniques used in other areas.

Additional questions to help get your thinking started:

1. Does the USGS suggest this region has a high, medium, or low seismic hazard potential?

2. Does this region receive a lot of precipitation? Does it fall during the entire year or more seasonally? Is some of the precipitation stored as snow?
3. Are stream valleys confined or do they meander across a flat landscape. Imagine what the streams might look like in flood-stage.
4. Are there locations where slopes have been locally steepened or otherwise modified either naturally (e.g. under cut by stream) or as a result of human modifications to the landscape (e.g. road-cut, mining, etc.).
5. Might the underlying regional geology (bedrock and surficial) increase the mass-wasting potential in any part of this region?
6. Is there evidence from geodetic data for mass-redistribution (i.e., mass wasting) in this landscape?
7. Are there any residential areas or places that people congregate in regions with high potential for mass wasting?
8. Are there any residential areas or places that people congregate in regions downstream of regions with high potential for mass wasting?

In addition to the maps, here are some links to other resources:

- <http://www.oregongeology.org/sub/Landslide/Landslidehome.htm>
- <http://www.seattle.gov/dpd/aboutus/whoweare/emergencymanagement/>
- <http://www.portlandoregon.gov/pbem/53935>
- <http://landslides.usgs.gov/>
- <http://landslides.usgs.gov/learn/prepare.php>
- <http://pubs.usgs.gov/circ/1325/>

Hazard mapping grading criteria

Inclusion of structural elements (5)

	Included (1 point)	Not included (0 points)
Color scale with high, medium, low		
Shaded map		
Factors that contribute to mass wasting in the field area		
Summary of map interpretation		
Specific suggestions for preparation		

Map annotation (3)

Exemplary (3 pnts)	Basic (1-2 pnts)	Nonperformance (0 pnts)
<p>Areas of high, medium, and low hazards are justified using specific evidence from environmental and built characteristics.</p> <p>AND</p> <p>Areas of high, medium, and low hazard areas are accurate based on the environmental and built characteristics of the area.</p>	<p>Areas of high, medium, and low hazards are justified using specific evidence from environmental and built characteristics.</p> <p>AND</p> <p>Areas of high, medium, and low hazard areas are mostly accurate based on the environmental and built characteristics of the area, perhaps with 1-2 debatable areas.</p>	<p>Insufficient evidence is given to justify areas of high, medium, and low hazards.</p> <p>AND/OR</p> <p>Significant inaccuracies regarding areas of high, medium, and low hazard areas.</p>

Writing style & organization (5)

Exemplary (5 pnts)	Good (4 pnts)	Basic (3 pnts)	Needs improve-ment (1-2 pnts)	Nonperformance (0 pnts)
<p>Excellent writing style and organization.</p> <p>Written report is clear and well-organized.</p> <p>AND</p> <p>Structure is conducive to the logical progression of ideas.</p> <p>AND</p> <p>No spelling, grammar, or punctuation errors.</p>	<p>Very good writing style and organization:</p> <p>Written report is clear and well-organized.</p> <p>AND</p> <p>Structure is conducive to the logical progression of ideas.</p> <p>AND</p> <p>1-2 spelling, grammar, or punctuation errors.</p>	<p>Adequate writing style and organization:</p> <p>Overall report is clear and well-organized.</p> <p>AND</p> <p>Most ideas progress logically.</p> <p>AND/OR</p> <p>Several spelling, grammar, or punctuation errors that do not detract substantially from report.</p>	<p>Writing style and organization need improvement:</p> <p>Issues with organization and clarity of writing.</p> <p>AND/OR</p> <p>Ideas do not progress logically through the report.</p> <p>AND/OR</p> <p>Spelling, grammar, and punctuation errors detract from quality of report.</p>	<p>Unacceptable writing style and organization:</p> <p>Written report is unclear and disorganized.</p> <p>AND/OR</p> <p>Ideas do not progress logically through the report.</p> <p>AND/OR</p> <p>Major spelling, grammar, and punctuation errors throughout that detract from report quality.</p>

Clarity for intended audience (3)

Exemplary (3 pnts)	Basic (1-2 pnts)	Nonperformance (0 pnts)
<p>Report content is explained in a way that is easy for reader to understand and retain.</p>	<p>Majority of the report content is such that the reader can understand and retain content.</p>	<p>Substantial portions of report content are difficult to understand.</p> <p>OR</p> <p>Some portions of report are incomprehensible.</p>

Thoroughness & rigor (5)

Exemplary (5 pnts)	Good (4 pnts)	Basic (3 pnts)	Needs improve-ment (1-2 pnts)	Nonperformance (0 pnts)
<p>Excellent content.</p> <p>Multiple lines of evidence are insightfully and creatively addressed with an exemplary level of detail. AND Multiple examples of environmental and built characteristics are used as lines of evidence. AND Uncertainties/ambiguities in the data are explicitly discussed in the report. AND Includes concepts, ideas, and terminology in addition to those addressed during previous module exercises. Additional work and research has been done to enhance report.</p>	<p>Content is very good.</p> <p>Multiple lines of evidence are addressed with an above average level of detail. AND Both environmental and built characteristics are used as lines of evidence. AND Uncertainties/ambiguities are mentioned in the report. AND Includes concepts, ideas, and terminology addressed during module exercises.</p>	<p>Content is adequate.</p> <p>Multiple lines of environmental and/or built characteristics are addressed as evidence. AND Includes concepts, ideas, and terminology addressed during module exercises.</p>	<p>Content needs improvement.</p> <p>Only one line of evidence is addressed. AND Content does not include concepts, ideas, or terminology addressed during module exercises.</p>	<p>Content is unacceptable.</p> <p>Report does not provide evidence to support the conclusions made about mass wasting hazards in the Boulder Creek area.</p>

Accuracy (5)

Exemplary (5 pnts)	Good (4 pnts)	Basic (3 pnts)	Needs improve-ment (1-2 pnts)	Nonperformance (0 pnts)
<p>Scientifically accurate report with no content errors.</p>	<p>1 minor content error.</p>	<p>1-2 minor content errors that do not detract significantly from overall presentation.</p>	<p>Several minor content errors OR 1-2 major content errors.</p>	<p>Major content errors throughout report.</p>

Part 3 Reflection (3)

Exemplary (3 pnts)	Basic (1-2 pnts)	Nonperformance (0 pnts)
<p>Reflection clearly states how the student's understanding has evolved AND How that might affect future action or thinking AND Statements are clearly but concisely linked to evidence or experience.</p>	<p>Reflection states how the student's understanding has evolved AND How that might affect future action or thinking BUT The supporting evidence is not strongly and/or clear stated.</p>	<p>Reflection not effectively tied to course experience OR Completely lacking supporting evidence OR Missing</p>