GLOBAL MOUNTAIN ENVIRONMENTS

(GPHY 314)

- Fall 2017 -

Class Meets: MWF 11:00 – 11:50 am; Native American Center (NAC) 011

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Course Description and Objectives

The study of mountain environments and their physical processes around the globe: Andes, Appalachians, East African Mountains, European Alps, Hindu Kush-Himalaya-Karakoram, Pamir, Rocky Mountains, Southern Alps of New Zealand, Tien Shan, and others. Topics include mountain building, alpine glaciers, mountain geomorphology and climatology, mountain watersheds, mountain biogeography, and mountain hazards such as earthquakes and mass movements. We will also discuss the exploration of mountains and mountaineering.

By the end of this course, students should be able to:

1. Locate and describe the features of local mountain ranges, including geologic origin, major vegetation communities, and human impacts.
2. Describe the hierarchy of processes controlling the physical and biological patterns we see in mountain landscapes, locally and globally, and how these processes are affected by global change.
3. Access and evaluate primary scientific literature.
4. Identify a research question, collect and analyze data to address the question, and summarize findings in standard scientific formats (text and presentations).
5. Evaluate the work or your peers in a constructive and respectful manner.

Course Policies

Class Attendance and On-time Appearance

Attendance is recorded. Class attendance is essential to your success in class. Excessive lateness disturbs everyone else – please appear on time. You should have your lunch before or after class.

Open Door & Discussion

Please feel free to stop by during office hours or when my door is open to ask any questions you may have regarding the class. Please use this opportunity WHEN NEEDED.

Accommodations

The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and Disability Services for Students. If you think you may have a disability adversely affecting your academic performance, and you have not already registered with Disability Services, please contact Disability Services in Lommasson Center 154 or call 406.243.2243. I will work with you and Disability Services to provide an appropriate modification.

Academic Integrity

"All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the University. All students need to be familiar with the Student Conduct Code. The Code is available for review online at:
http://life.umt.edu/vpsa/student_conduct.php."

Readings, Assignments, and Examinations

Readings

Our (required) textbook is:
Price MF, Byers AC, Friend DA, Kohler T, Price LW (Eds.), *Mountain Geography: Physical and Human Dimensions*, University of California Press, Berkeley.

For every session, you find the assigned reading in the "Tentative Schedule" below. Make sure to read the assigned text before class; this will aid in understanding the material that will be presented during the class period and for the development of any questions about the material you may have.

An excellent reading for preparing a research paper is:
Turabian KL (2007): A manual for writers of term papers, theses, and dissertations. The University of Chicago Press, Chicago, 436 pages.

Additional Course Material

All additional course material will be made available online through Moodle after the lectures in class. Download and use these resources for your studies in preparation for assignments and exams.

Research Paper

You will write a research paper on a specialized topic that matches the main topics of the course (see "Tentative Schedule"). The main body (text) of this research paper is approximately 8-10 pages long (double-spaced, Times Roman 12, including cover page, table of content, and references) **plus** appendix including figures and tables. **This must be submitted by the due date**. If you decide to work with one or two peers, the paper length doubles accordingly to the team size.

You (and your peer/s) will develop your paper in steps by submitting **six "Paper Preparation" assignments**:

1. Research Topics
2. Reference List 1
3. Table of Content
4. Reference List
5. Abstract
6. Paper Draft

All work has to be submitted in the two following ways (each person has to submit via Moodle!):

1. **Hard copy** of Microsoft Word, Excel, and/or Powerpoint documents including all names.
2. **Digital version**, uploaded to Moodle.

Presentation

You (and your peer/s) will give a class presentation at the end of the term about your topic. The presentation is 15 minutes long *including* a brief discussion.

Examinations

All three "multiple choice" exams will take place in the classroom. They are subjective, not comprehensive; this means that the exam will encompass only the material that is covered in lectures and discussions between exams. The rules for the examinations are as follows:

1. You will take each exam as scheduled. Make-up exams are not allowed—except as listed in the Make-up exam policy below.
2. Material for the exam will be from the required textbook and other readings and all other distributed material. Attendance for each lecture is recommended (and taken) in order that you take notes for each exam.
3. Make-up Exam Policy:
    - All Students must take the final exam as scheduled. Conflicts must be settled with the Dean. This is University Policy and there are no exceptions.
    - All Students must take each exam as scheduled. If an exam is missed, the student will receive a zero (0) on the exam.

- These are the only exceptions that will warrant a make-up exam: university events—such as sporting or music events; military obligations; religious holidays; serious family emergency; medical emergencies or serious illness; court-imposed legal obligations such as subpoenas or jury duty; serious weather conditions; special curricular requirements such as judging trips or field trips.
- Any student requiring an exception under this policy must do so **prior** to the scheduled exam—unless in the case of an actual emergency (sudden hospitalization). A student must provide official documentation of the reason for absence **in advance**.
- If a make-up exam is approved. It must be completed within one week of the original exam and scheduled with the Teaching Assistant.

Work Evaluation and Final Grading

Three exams (50 points each)	150 points
Six Research Paper Preparation Assignments (25 points each)	150 points
Research Paper (Final Version)	100 points
Presentation	100 points
Class Attendance	100 points
Total Points	**600 points**

Missed Classes

0-1	A	2	B	3	C	4	D	>4	F

Grading Scheme

93-100	A	83-86	B+	77-79	C+	67-69	D+	<60	F
		87-89	B	73-76	C	63-66	D		
90-92	A-	80-82	B-	70-72	C-	60-62	D-		

Late assignments will be penalized. An assignment that is turned in one day late will have 10% of the available points deducted from the score. An assignment that is turned in two days late will have 20% of the available points deducted from the score. No credit will be awarded for assignments that are more than two days late. "Day" denotes a business day (Monday through Friday) not the time interval between class meetings. For example, an assignment that is due on Thursday but turned in on Monday will be counted two days late.

Tentative Schedule

Date	Topic	Readings	Other
WEEK 1			
01-Sep	Introduction to the Course	---	
WEEK 2			
04-Sep	Holiday: Labor Day	---	No Class
06-Sep	What is a Mountain?	TB.1	
08-Sep	Movie: Taller than Everest	---	Submit Paper Topic
WEEK 3			
11-Sep	Explorers and Mountaineers	Paper	
13-Sep	Movie: Everest	---	
15-Sep	Mountain Origins I – Plate Tectonics and Boundaries	TB.2	
WEEK 4			
18-Sep	Mountain Origins II – Folding and Faulting	TB.2	
20-Sep	Mountain Origins III – Plutonism and Volcanism	TB.2	
22-Sep	Movie: St. Helens: Out of the Ash	---	Submit References 1
WEEK 5			
25-Sep	Mountain Climate I – Climatic Controls	TB.3	
27-Sep	Mountain Climate II – Climatic Elements	TB.3	
29-Sep	Glaciers	TB.4	
WEEK 6			
02-Oct	Research Project: Glacier Monitoring in Ladakh, Himalaya, India	Paper R1	
04-Oct	Research Project: Snow Monitoring Using Drones	Paper R2	
06-Oct	Exam 1	---	Submit Outline
WEEK 7			
09-Oct	Mountain Landforms and Landscapes	TB.5	
11-Oct	Research Project: Landscape Evolution, Hindu Kush, Pakistan	Paper R3	
13-Oct	Research Project: GIScience in Mountain Geomorphology	Paper R4	
WEEK 8			
16-Oct	Mass Wasting	TB.5	
18-Oct	Research Project: 2005 Kashmir Earthquake, Himalaya, Pakistan	Paper R5	
20-Oct	Global Mountains: South Asia	Paper	Submit References 2
WEEK 9			
23-Oct	Movie: Everest – the Death Zone	---	
25-Oct	Research Project: K2, Karakoram, Pakistan	Paper R6	
27-Oct	Mountain Soils	TB.6	
WEEK 10			
30-Oct	Mountain Vegetation	TB.7	
01-Nov	Mountain Wildlife	TB.8	
03-Nov	Global Mountains: Central Asia	Paper	Submit Abstract
WEEK 11			
06-Nov	Research Project: Glacier Monitoring in the Altai Mountains, Mongolia	Paper R7	
08-Nov	Exam 2	---	
10-Nov	Holiday: Veterans Day	---	
WEEK 12			
13-Nov	Global Mountains: North America	Paper	
15-Nov	Movie: Glacier National Park	---	
17-Nov	Global Mountains: South America	Paper	Submit Paper Draft
WEEK 13			
20-Nov	Global Mountains: Europe	Paper	
22-Nov	Holiday: Thanksgiving	---	No Class
24-Nov	Holiday: Thanksgiving	---	No Class
WEEK 14			
27-Nov	Global Mountains: Africa	Paper	
29-Nov	Movie: Volcano Above the Clouds	---	
01-Dec	Global Mountains: Australia, East Asia, and Pacific	Paper	
WEEK 15			
04-Dec	Final Student Presentations (1-3)	---	
06-Dec	Final Student Presentations (4-6)	---	
08-Dec	Final Student Presentations (7-9)	---	
WEEK 16			
11-Dec	Final Student Presentation (10-12)	---	Submit Paper & PPT
WEEK 17			
18-Dec	Exam 3, 8:00 – 9:50 am		

TB = Textbook

Required Readings

Lectures are usually accompanied by required readings and lecture "notes". All material will be made available as pdf-files for download from Moodle, and additional material for interested students might be posted. Please, take your own notes during class.

What is a Mountain?

Byers AC, Price LW, Price MF (2013): Introduction to Mountains. In: Price MF, Byers AC, Friend DA, Kohler T, Price LW (Eds.), *Mountain Geography: Physical and Human Dimensions*, University of California Press, Berkeley, 1-10.

Explorers and Mountaineers

Helferich G (2004): Chimborazo. In: Helferich G, *Humboldt's Cosmos. Alexander von Humboldt and the Latin American Journey that Changed the Way We See the World*, Gotham, New York, 211-233.

Mountain Origins

Shroder JF Jr, Price LW (2013): Origins of Mountains. In: Price MF, Byers AC, Friend DA, Kohler T, Price LW (Eds.), *Mountain Geography: Physical and Human Dimensions*, University of California Press, Berkeley, 11-40.

Climate

Bach AJ, Price LW (2013): Mountain Climate. In: Price MF, Byers AC, Friend DA, Kohler T, Price LW (Eds.), *Mountain Geography: Physical and Human Dimensions*, University of California Press, Berkeley, 41-84.

Snow, Ice, Avalanches, and Glaciers

Dexter LR, Birkeland KW, Price LW (2013): Snow, Ice, Avalanches, and Glaciers. In: Price MF, Byers AC, Friend DA, Kohler T, Price LW (Eds.), *Mountain Geography: Physical and Human Dimensions*, University of California Press, Berkeley, 85-126.

Landscapes and Mass Wasting

Janke JR, Price LW (2013): Mountain Landforms and Geomorphic Processes. In: Price MF, Byers AC, Friend DA, Kohler T, Price LW (Eds.), *Mountain Geography: Physical and Human Dimensions*, University of California Press, Berkeley, 127-166.

Research Projects

R1 - Kamp U, Byrne M, Bolch T (2011): Glacier fluctuations between 1975 and 2008 in the Greater Himalaya Range of Zanskar, southern Ladakh. *Journal of Mountain Science*, 8, 374-389.

R2 -

R3 - Owen LA, Kamp U, Spencer JQ, Haserodt K (2002): Timing and style of Late Quaternary glaciations in the eastern Hindu Kush, Chitral, northern Pakistan: a review and revision of the glacial chronology based on new optically stimulated luminescence dating. *Quaternary International*, 97/98, 41-55.

R4 - Bishop MP, Bonk R, Kamp U, Shroder Jr JF (2001): Terrain analysis and data modeling for alpine glacier mapping. *Polar Geography*, 25, 182-201.

R5 - Owen LA, Kamp U, Khattak GA, Harp E, Keefer DK, Bauer M (2008): Landslides triggered by the October 8, 2005, Kashmir earthquake. *Geomorphology*, 94, 1-9.

R6 - Seong YB, Bishop MP, Bush A, Clendon P, Copland L, Finkel R, Kamp U, Owen LA, Shroder Jr JF (2009): Landforms and landscape evolution in the Skardu, Shigar, and Braldu valleys, Central Karakoram Mountains. *Geomorphology*, 103, 251-267.

R7 - Kamp U, McManigal KG, Dashtseren A, Walther M (2013): Documenting glacial changes between 1910, 1970, 1992 and 2010 in the Turgen Mountains, Mongolian Altai, using repeated photographs, topographic maps and satellite imagery. *The Geographical Journal*, 179, 248-263.

Central Asia

Khrguian A (1969): The U.S.S.R. In: Noyce W, McMorrin I (Eds.), *World Atlas of Mountaineering*. Macmillan, London, 119-128.

Maraini (1969): Tibet and China. In: Noyce W, McMorrin I (Eds.), *World Atlas of Mountaineering*. Macmillan, London, 129-133.

South Asia

Noyce W (1969a): The Greater Himalaya. In: Noyce W, McMorrin I (Eds.), *World Atlas of Mountaineering*. Macmillan, London, 80-118.

Europe

Noyce W (1969b): The Alps. In: Noyce W, McMorrin I (Eds.), *World Atlas of Mountaineering*. Macmillan, London, 17-43.

Neill J (1969): The Caucasus. In: Noyce W, McMorrin I (Eds.), *World Atlas of Mountaineering*. Macmillan, London, 66-75.

South America

Shipton E (1969): The mountains of South America. In: Noyce W, McMorrin I (Eds.), *World Atlas of Mountaineering*. Macmillan, London, 186-203.

North America

Bell G (1969): The mountains of North America. In: Noyce W, McMorrin I (Eds.), *World Atlas of Mountaineering*. Macmillan, London, 164-185.

Africa

McMorrin I (1969): The mountains of Africa. In: Noyce W, McMorrin I (Eds.), *World Atlas of Mountaineering*. Macmillan, London, 140-152.

Australia, East Asia, and Pacific

Lowe G (1969): The mountains of Australasia. In: Noyce W, McMorrin I (Eds.), *World Atlas of Mountaineering*. Macmillan, London, 153-163.

Noyce W (1969c): Japan. In: Noyce W, McMorrin I (Eds.), *World Atlas of Mountaineering*. Macmillan, London, 134-138.

Optional Readings

What is a Mountain?

Friend DA (2002): Mountain Geography in 2002: The International Year of Mountains. *The Geographical Review*, 92, iii-vi.

Funnell D, Parish R (2001a): Mountains in geographical enquiry. In: Funnell D, Parish R, *Mountain Environments and Communities*. Routledge, London, 3-32.

Funnell DC, Price MF (2003): Mountain geography: a review. *The Geographical Journal*, 169, 183-190.

Gerrard J (1990a): The nature and distinctiveness of mountains. In: Gerrard J, *Mountain Environments. An Examination of the Physical Geography of Mountains*. MIT Press, Cambridge, 3-7.

Ives JD, Messerli B, Spiess E (1997): Mountains of the world. A global priority. In: Messerli B, Ives JD (Eds.), *Mountains of the World, A Global Priority*, Parthenon, New York, 1-15.

Peattie R (1936): Introduction. In: Peattie R, *Mountain Geography - A Critique and Field Study*. Greenwood Press, New York, 3-8.

Price LW (1981a): What is a mountain? In: Price LW, *Mountains and Man: A Study of Process and Environment.* Berkeley: University of California Press, 1-5.

Thomas L (1964a): The magic of the mountains. In: Thomas L, *Lowell Thomas' Book of the High Mountains*, Messner, New York, 18-69.

World Mountain People Association (2006): *International Mountain Day 2006: the urgency of international mobilisation*. Press Release.

Explorers and Mountaineers

Ambrose SE (1996a): Over the Continental Divide. In: Ambrose SE, *Undaunted Courage. Meriwether Lewis, Thomas Jefferson, and the Opening of the American West*, Simon and Schuster, New York, 268-288.

Ambrose SE (1996b): Over the Bitterroots. In: Ambrose SE, *Undaunted Courage. Meriwether Lewis, Thomas Jefferson, and the Opening of the American West*, Simon and Schuster, New York, 289-301.

Fleck RF (Ed.), *John Muir. Mountaineering Essays*, The University of Utah Press, Salt Lake City, 175 pages.

Funnell D, Parish R (2001b): The physical environment of mountains. In: Funnell D, Parish R, *Mountain Environments and Communities*. Routledge, London, 69-70.

Golay M, Bowman JS (2006): *North American Exploration*. Castle, Edison, 354-358.

Hillary E (1955): Summit. In: Hillary E, *High Adventure. The True Story of the First Ascent of Everest*, Odhams, Watford, 225-238.

Jenkins M (2008): Ice worriers. *National Geographic*, January. http://ngm.nationalgeographic.com/2008/01/himalaya-winter-climb/nanga-parbat-text.html

Price LW (1981c): Implications for man. In: Price LW, *Mountains and Man: A Study of Process and Environment.* Berkeley: University of California Press, 353-360.

Thomas L (1964c): When man and mountains meet. In: Thomas L, *Lowell Thomas' Book of the High Mountains*, Messner, New York, 445-471.

Mountain Origins

Cutler A (2003): *The Seashell on the Mountaintop. A Story of Science, Sainthood, and the Humble Genius Who Discovered a New History of the Earth*. Dutton, New York, 73-74, 118-119, 156-157, 194-195.

Gerrard J (1990a): The nature and distinctiveness of mountains. In: Gerrard J, *Mountain Environments. An Examination of the Physical Geography of Mountains*. MIT Press, Cambridge, 7-13.

Gerrard J (1990b): Volcanoes as mountains. In: Gerrard J, *Mountain Environments. An Examination of the Physical Geography of Mountains*. MIT Press, Cambridge, 192-223.

Hunt CB (1967): *Physiography of the United States*. Freeman, San Francisco, 432-444.

McKnight TL (2004): *Regional Geography of the United States and Canada*. Pearson-Prentice Hall, Upper Saddle River, 400-407.

Price LW (1981d): Origin of mountains. In: Price LW, *Mountains and Man: A Study of Process and Environment.* Berkeley: University of California Press, 24-56.

Shimer JA (1972): *Field Guide to Landforms in the United States*. Macmillan, New York, 132-136, 152-158.

Climate

Funnell D, Parish R (2001b): The physical environment of mountains. In: Funnell D, Parish R, *Mountain Environments and Communities*. Routledge, London, 35-51.

Price LW (1981g): Mountain climate. In: Price LW, *Mountains and Man: A Study of Process and Environment.* Berkeley: University of California Press, 57-125.

Snow, Ice, Avalanches, and Glaciers

Appenzeller T (2007): The big thaw. *National Geographic*, June. http://ngm.nationalgeographic.com/2007/06/big-thaw/big-thaw-text.html

Bolch T, Kamp U, Buchroithner M (2006): Glaciers from space: examination of new methods for mapping debris-covered glaciers at Mt. Everest, Nepal from space. *GeoConnexion International Magazine*, 5, 58-59.

Butler DR (1979): Snow avalanche path terrain and vegetation, Glacier National Park, Montana. *Arctic and Alpine Research*, 11, 17-32.

Gerrard J (1990e): Glaciation of mountains. In: Gerrard J, *Mountain Environments. An Examination of the Physical Geography of Mountains*. MIT Press, Cambridge, 162-177.

Gerrard J (1990f): Mountains under pressure: applied physical geography. In: Gerrard J, *Mountain Environments. An Examination of the Physical Geography of Mountains*. MIT Press, Cambridge, 224-232.

Haeberli W (1994): Accelerated glacier and permafrost changes in the Alps. In: Beniston M (Ed.) (1994): *Mountain Environments in Changing Climates*. Routledge, 91-107.

Hewitt K (2005): The Karakoram anomaly? Glacier expansion and the 'elevation effect,' Karakoram Himalaya. *Mountain Research and Development*, 25, 332-340.

Johnson EA (1987): The relative importance of snow avalanche disturbance and thinning on canopy plant populations. *Ecology*, 68, 43-53.

Kamp U, Pan CG (2015): Inventory of glaciers in Mongolia, derived from Landsat imagery from 1989 to 2011. *Geografiska Annaler: Series A, Physical Geography*, 97, 653-669.

Kulakowski D, Rixen C, Bebi P (2006): Changes in forest structure and in the relative importance in climatic stress as a result of suppression of avalanche disturbances. *Forest Ecology and Management*, 223, 66-74.

Price LW (1981e): Snow, glaciers, and avalanches. In: Price LW, *Mountains and Man: A Study of Process and Environment.* Berkeley: University of California Press, 126-165.

Raup B et al. (2007): Remote sensing and GIS technology in the Global Land Ice Measurements from Space (GLIMS) project. *Computers and Geosciences*, 33, 104-125.

Zwingle E (2006): Meltdown: the Alps under pressure. *National Geographic*, February. http://ngm.nationalgeographic.com/2006/02/melting-alps/zwingle-text.html

Landscapes and Mass Wasting

Barsch D, Caine N (1984): The nature of mountain geomorphology. *Mountain Research and Development*, 4, 287-298.

Funnell D, Parish R (2001b): The physical environment of mountains. In: Funnell D, Parish R, *Mountain Environments and Communities*. Routledge, London, 51-57.

Gerrard J (1990a): The nature and distinctiveness of mountains. In: Gerrard J, *Mountain Environments. An Examination of the Physical Geography of Mountains*. MIT Press, Cambridge, 18-35.

Gerrard J (1990c): Weathering and mass movement. In: Gerrard J, *Mountain Environments. An Examination of the Physical Geography of Mountains*. MIT Press, Cambridge, 67-82.

Gerrard J (1990d): Slope form and evolution. In: Gerrard J, *Mountain Environments. An Examination of the Physical Geography of Mountains*. MIT Press, Cambridge, 132-161.

Gerrard J (1990e): Glaciation of mountains. In: Gerrard J, *Mountain Environments. An Examination of the Physical Geography of Mountains*. MIT Press, Cambridge, 177-191.

Price LW (1981e): Snow, glaciers, and avalanches. In: Price LW, *Mountains and Man: A Study of Process and Environment.* Berkeley: University of California Press, 142-153.

Price LW (1981f): Landforms and geomorphic processes. In: Price LW, *Mountains and Man: A Study of Process and Environment.* Berkeley: University of California Press, 166-189, 209-228.

Shimer JA (1972): *Field Guide to Landforms in the United States*. Macmillan, New York, 159-169, 219-222.

Soils

Funnell D, Parish R (2001b): The physical environment of mountains. In: Funnell D, Parish R, *Mountain Environments and Communities*. Routledge, London, 57-59.

Price LW (1981h): Mountain soils. In: Price LW, *Mountains and Man: A Study of Process and Environment.* Berkeley: University of California Press, 233-253.

Price LW, Harden CP (2013): Mountain Soils. In: Price MF, Byers AC, Friend DA, Kohler T, Price LW (Eds.), *Mountain Geography: Physical and Human Dimensions*, University of California Press, Berkely, 167-182.

Vegetation

Funnell D, Parish R (2001b): The physical environment of mountains. In: Funnell D, Parish R, *Mountain Environments and Communities*. Routledge, London, 59-66.

Gerrard J (1990g): Mountain geoecology. In: Gerrard J, *Mountain Environments. An Examination of the Physical Geography of Mountains*. MIT Press, Cambridge, 36-66.

Hadley KS, Price LW, Grabherr G (2013): Mountain Vegetation. In: Price MF, Byers AC, Friend DA, Kohler T, Price LW (Eds.), *Mountain Geography: Physical and Human Dimensions*, University of California Press, Berkely, 183-220.

Jenik J (1997): The diversity of mountain life. In: Messerli B, Ives JD (Eds.), *Mountains of the World, A Global Priority*, Parthenon, New York, 199-231.

Jokisch BD, Bridget ML (2002): One last stand? Forest change on Ecuador's Eastern Cordillera. *The Geographical Review*, 92, 235-256.

Klötzli F (1997): Biodiversity and vegetation belts in tropical and subtropical mountains. In: Messerli B, Ives JD (Eds.), *Mountains of the World, A Global Priority*, Parthenon, New York, 232-235.

Price LW (1981i): Mountain vegetation. In: Price LW, *Mountains and Man: A Study of Process and Environment.* Berkeley: University of California Press, 254-300.

Schoennagel T, Veblen TT, Romme WH (2004): The interaction of fire, fuels, and climate across Rocky Mountain Forests. Bioscience, 54, 661-676.

Young KR, Blanca L (2000): Biodiversity conservation in Peru's eastern montane forests. *Mountain Research and Development*, 20, 208-211.

Wildlife

Funnell D, Parish R (2001b): The physical environment of mountains. In: Funnell D, Parish R, *Mountain Environments and Communities*. Routledge, London, 67-69.

Jenik J (1997): The diversity of mountain life. In: Messerli B, Ives JD (Eds.), *Mountains of the World, A Global Priority*, Parthenon, New York, 199-231.

Price LW (1981j): Wildlife. In: Price LW, *Mountains and Man: A Study of Process and Environment.* Berkeley: University of California Press, 301-345.

Price LW, Geist V (2013): Mountain Wildlife. In: Price MF, Byers AC, Friend DA, Kohler T, Price LW (Eds.), *Mountain Geography: Physical and Human Dimensions*, University of California Press, Berkely, 221-252.

Natural Hazards

Gerrard J (1990c): Weathering and mass movement. In: Gerrard J, *Mountain Environments. An Examination of the Physical Geography of Mountains*. MIT Press, Cambridge, 82-92.

Gerrard J (1990f): Mountains under pressure: applied physical geography. In: Gerrard J, *Mountain Environments. An Examination of the Physical Geography of Mountains*. MIT Press, Cambridge, 232-247.

Hewitt K (1997): Risk and disasters in mountain lands. In: Messerli B, Ives JD (Eds.), *Mountains of the World, A Global Priority*, Parthenon, New York, 371-408.

Kamp U, Growley BJ, Khattak GA, Owen LA (2008): GIS-based landslide susceptibility mapping for the 2005 Kashmir earthquake region. *Geomorphology*, 101, 631-642.

Kamp U, Owen LA, Growley BJ, Khattak GA (2009): Back analysis of landslide susceptibility zonation mapping for the 2005 Kashmir earthquake: an assessment of the reliability of susceptibility zoning maps. – *Natural Hazards*. (In Press).

Owen LA, Kamp U, Khattak GA, Harp E, Keefer DK, Bauer M (2008): Landslides triggered by the October 8, 2005, Kashmir earthquake. *Geomorphology*, 94, 1-9.

Price LW (1981f): Landforms and geomorphic processes. In: Price LW, *Mountains and Man: A Study of Process and Environment.* Berkeley: University of California Press, 189-209.

Price LW (1981c): Implications for man. In: Price LW, *Mountains and Man: A Study of Process and Environment.* Berkeley: University of California Press, 376-388.

Hydrology

Gerrard J (1990h): Mountain hydrology and river processes. In: Gerrard J, *Mountain Environments. An Examination of the Physical Geography of Mountains*. MIT Press, Cambridge, 93-131.

Hamilton LS (1988): Forestry and watershed management. In: Ives JD, Pitt DC (Eds.), *Deforestation. Social Dynamics in Watersheds and Mountain Ecosystems*. Routledge, London, 99-131.

Hamilton LS, Bruijnzeel LA (1997): Mountain watersheds – integrating water, soil, gravity, vegetation, and people. In: Messerli B, Ives JD (Eds.), *Mountains of the World, A Global Priority*, Parthenon, New York, 337-370.

Environmental Change

Byers A (2000): Contemporary landscape change in the Huascarán National Park and buffer zone, Cordillera Blanca, Peru. *Mountain Research and Development*, 20, 52-63.

Byers A (2005). Contemporary human impacts on alpine ecosystems in the Sagarmatha (Mt. Everest) National Park, Khumbu, Nepal. *Annals of the Association of American Geographers*, 95, 112-140.

Chalise SR (1994): Mountain environments and climate change in the Hndu Kush-Himalayas. In: Beniston M (Ed.) (1994): *Mountain Environments in Changing Climates*. Routledge, 382-404.

Funnell D, Parish R (2001c): Environmental change. In: Funnell D, Parish R, *Mountain Environments and Communities*. Routledge, London, 179-196.

Marston RA (2008): Land, life, and environmental change in mountains. *Annals of the Association of American Geographers*, 98, 507-520.

Preston D et al. (2003): Grazing and environmental change on the Tarija Altiplano, Bolivia. *Mountain Research and Development*, 23, 141-148.

Price M, Barry RG (1997): Climate change. In: Messerli B, Ives JD (Eds.), *Mountains of the World, A Global Priority*, Parthenon, New York, 409-445.

Central Asia

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South Asia

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- International Mountain Society (IMS) (http://www.mrd-journal.org/IMS_imem.asp)
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- USGS (United States Geological Service) – Climate Change in Mountain Ecosystems (CCME) (http://www.nrmsc.usgs.gov/research/global.htm)

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- WWF (World Wildlife Fund) (http://www.worldwildlife.org/)

Research Paper and Presentation – Potential Topics

These papers/presentations shall describe topics and/or regional case studies of your choice. Some examples are listed below; additional topics are welcome. (Red: covered by instructor—this does not mean that you could not pick this topic and write an in-depth paper based on the information presented in class).

Topological Papers

- Acute Mountain Sickness/ Altitude Sickness
- Alpine Medical Plants
- Deforestation in Mountains
- Environmental Change in Mountains
- Forestry
- Glacial Processes and Landforms: Rocky Mountain NP, Yosemite NP, North Cascades NP, Olympic NP, Glacier NP, Denali NP
- Global Morphology and Tectonics: Rocky Mountain NP
- Igneous Activity Landforms: Mount Rainier NP, Yellowstone NP, Hawaii NP, Crater Lake NP
- Mining
- Mountain Biodiversity
- Mountain Geomorphology
- Mountain Hazards and Risks (Earthquakes, GLOFs, Landslides)
- Mountain Vegetation
- Mountain Weather and Climate
- Mountain Wildlife (Mountain Gorilla, Mountain Lion)
- Mountains and City Planning
- Planetary Mountains
- Submarine Mountains
- The Fourteen 8,000+ Peaks
- The Seven Summits

Regional Papers: Mountains in the United States

- Central Montana (Crazy Mountains, Milk River, Giant Springs)
- Hawaiian Islands
- Mountain Ranges of Alaska
- Mountain Ranges and of the lower 48 (Adirondacks, Appalachians, Blue Ridge, Cascades, Ozarks, Pacific Border, Rocky Mountains, Sierra Nevada)
- Northwestern Montana (Glacier NP, Glacial Lake Missoula, Rattlesnake Mountains, Mission Range, Swan Valley)
- Southwestern Montana (Yellowstone NP, Boulder Batholith, Elkhorn Mountains, Highland Range, Garnet Range, Idaho Batholith, Bitterroot Valley)

Regional Papers: Mountains in Other World Regions

- Antarctica
- Central and Southern Asia: Altai; Himalayas; Hindu Kush; Karakoram; Pamirs; Tien Shan
- Europe: Alps; Carpathians; Central Massif; Pyrenees
- Mountains of Australia
- Mountains of Central America
- Mountains of East Africa
- Mountains of Germany
- Mountains of Great Britain
- Mountains of Mexico
- Mountains of Northern Africa: Atlas; Hoggar; Tibesti; Gilf Kebir
- Mountains of Norway
- New Zealand: Southern Alps
- South America: Andes; Tepui Mountains
- Southern Africa: Drakensberg / Maloti Mountains; Table Mountain
- Southeast and East Asia: Japanese Alps

Movies

- *Alexander von Humboldt. Venezuela, 1799.*1976, 49 min.
- *A River Runs Through.* 1993, 123 min, UM: DVD 01281
- *Bhutan. The last Shangri-la.* 1997, 60 min, UM: VT 07848
- *Brokeback Mountain.* 2006, 135 min, UM: DVD 791.43 B867b 2006
- *Everest.* (IMAX), 1998, 45 min, UM: DVD 00417
- *Everest. The Death Zone.* 1998, 57 min, UM: VT 08333
- *Exploring the Himalayas*. 1990, 60 min, UM: VT 03105
- *Great Peaks*. 2006, 280 min, UM: DVD 01603
- *Himalaya.* 2002, 104 min, UM: DVD 00158
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- *Journals of Lewis and Clark.* 1990, 54 min, UM: 21199
- *Lewis and Clark. Great Journey West.* 2003, 45 min, UM: DVD F 592.4 .L4 N3 2002
- *Lewis and Clark. The Journey of the Corps of Discovery.* 1997, 232 min, UM: VT 13239
- *Mountain Islands*. 1990, 30 min, UM: VT 13031
- *Ladakh.* 1986, 86 min, UM: VT 06101
- *Nanga Parbat. Naked Mountain.* 2001, 57 min, UM: VT 12320

- *Seven Years in Tibet*. 1997, 143 min, UM: DVD 02244
- *Sculpted by Floods*. The Northwest Ice Legacy. 2001, 57 min, UM: Kamp
- *Taller than Everest*. UM: Kamp
- *The Trail. Lewis and Clark Expedition 1803-1806*. 1996, 88 min, UM: VT 08731
- *Tibet's Holy Mountain*. 1994, 52 min, UM: VT 06091

Mountain Explorers and Mountaineers

Hillary, Edmund and Norgay, Tenzing; Lewis, Meriwether and Clark, William; Messner, Reinhold; Muir, John; von Humboldt, Alexander

Mountain Researchers

Barry, Roger; Byers, Alton; Fagre, Daniel; Haeberli, Wilfried; Hewitt, Kenneth; Ives, Jack; Messerli, Bruno; Price, Martin; Troll, Carl

Mountainous environments. Awe-inspiring and easy to love â€“ mountains offer a huge range of environments for wildlife and people. Why they're important Challenges Wildlife How we're helping. Why mountain environments are so important. What a flat, dull place the world would be without mountains. Formed over millions of years by relentless movements of the planet's crust, squeezing and lifting land upwards to the sky, mountain ranges make up about a fifth of the Earth's surface.