

THE MONSOON

THE ONSET DATES OF THE MONSOON are fairly predictable, so farmers in South Asia plan their planting seasons around the annual arrival of rain. Everest climbers also plan their ascent around the calm weather that precedes the arrival of the monsoon in mid-June. Once the summer monsoon arrives, the mountain is shrouded in fog and snowstorms, making climbing almost impossible. The date of the summer monsoon's retreat is less predictable, with more storms rather than the "calm before the storm" that is common in spring. This, combined with deep snows and more possibility of avalanches, pushes most climbing teams to summit in the spring.

GUIDING QUESTION

How do the monsoons affect the climbing season on Everest?

Students examine maps of monsoon seasons and climographs to understand precipitation patterns on Everest, then determine the best time of year to climb.



Handouts

- *Monsoon Winds of South Asia*
- *Climographs of the Everest Region*

Film Clip

- *Monsoon Sets In*

VOCABULARY

- air pressure
- climate
- precipitation
- monsoon
- temperature
- weather

DIRECTIONS

1. Watch clips to observe the weather during filming.

Watch several of the film clips, such as the trailer, "Finding George Mallory's Body," and others, observing the weather only in each clip. Have students take notes then describe what they see, discussing any surprises. Ask: *What factors affect the types of clothing needed at different elevations?* Discuss the difference between weather and climate, imagining changes in the weather on a daily basis, and the patterns of climate that are observed over longer periods of time. Everest climbers have to pay attention to both; they must determine when to schedule an expedition and also what climbs they can or cannot attempt on a given day. Have students watch one more clip, "Monsoon Sets In." Ask: *Why would climbers such as Conrad Anker be worried about the monsoon?*

2. Analyze the maps of South Asia's monsoon patterns in winter and summer.

Have students find Mount Everest on the maps on **Handout 1**. South Asia and the Himalaya are affected each year by the monsoon climate of South Asia. The term monsoon comes from the Arabic word "mausim," meaning "season." Many people think monsoons are named after the heavy rains they bring, but actually a monsoon is a seasonal change in the direction of the prevailing winds. Changes in air pressure with the seasons affect wind direction. Referring students to the maps on the handout, ask:

- *In winter, where do winds originate? (over land)*
- *In summer, where do the winds originate? (over water)*
- *Which winds do you think would bring rains, and which would bring dry air? (In South Asia, winter winds over land bring dry weather, and summer winds moving over the ocean bring precipitation.)*
- *What do you think happens to that precipitation at high altitudes on Mount Everest? (precipitation is snow)*



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“We had the same challenges as Mallory in 1924. We were there late in the season. If we didn’t get up the mountain before monsoon hit we’d be in very serious trouble.”

– Conrad Anker

- *In what ways might the monsoon affect the Sherpa and other communities who live near Mount Everest?*
- *How do you think the summer monsoon affects people throughout South Asia?*
- *What do you think precipitation patterns are like on the northern side of Mount Everest? Why?*

3. Create climographs to analyze the region’s climate throughout the year.

Distribute **Handout 2: Climographs of the Everest Region**. Have students transfer the data from the charts for Lhasa and Kathmandu to the climographs, then look for temperature and precipitation patterns. Climographs are graphic depictions of the average monthly precipitation (as a bar graph) and temperatures (in a line graph) for a certain place. Discuss the questions on the handout and the likely impacts of the climate patterns on Mount Everest and its surroundings. Students may need help in recognizing the role of elevation in Mount Everest’s climate patterns. *Discuss how the climate might be different on Everest than in Kathmandu or Lhasa. Why do most climbers choose to summit in the late spring? Why not during other seasons?*

EXTENDING THE LESSON

Have students research the impact of the jet stream on the winds reaching Mount Everest. Find out when the winds are most ideal for climbing Everest. How could high winds affect an expedition?

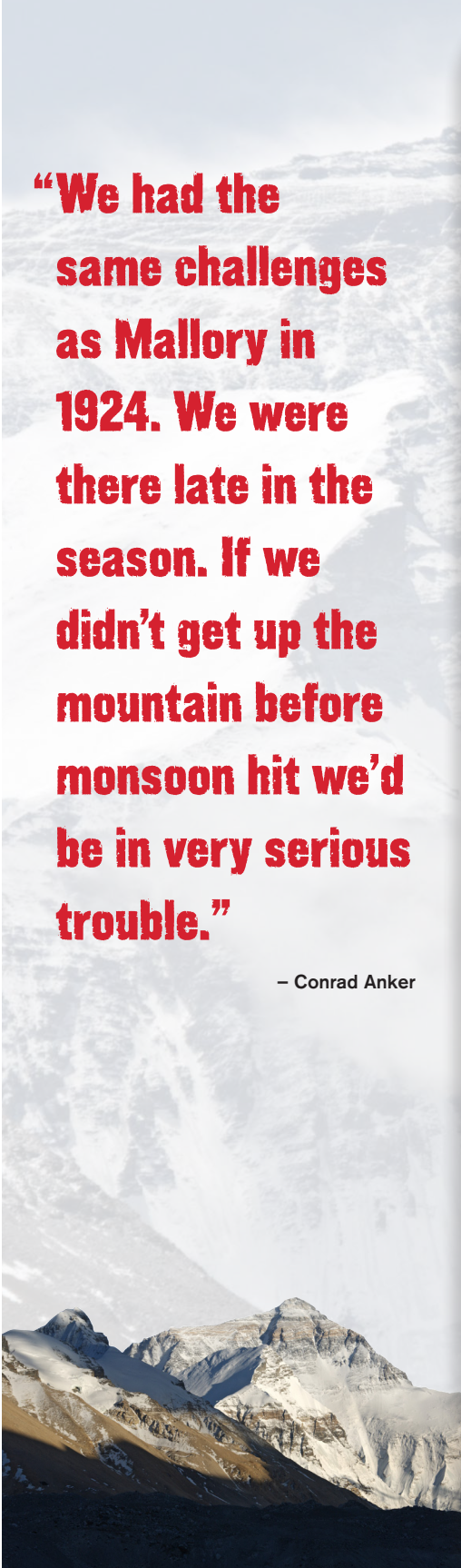
Compare the climates of Mount Everest with other major world peaks, such as Mount McKinley/Denali, Kilimanjaro, K2, Aconcagua. Are the climates similar? If there is no monsoon influence, during which season might climbers choose to summit? What other geographic factors affect the climate on these mountains?

Explore the climate north of the Himalaya, or on the leeward side of any mountain chain, to see the arid or semi-arid climate type that occurs there because of the rainshadow effect.

SUGGESTED RESOURCES

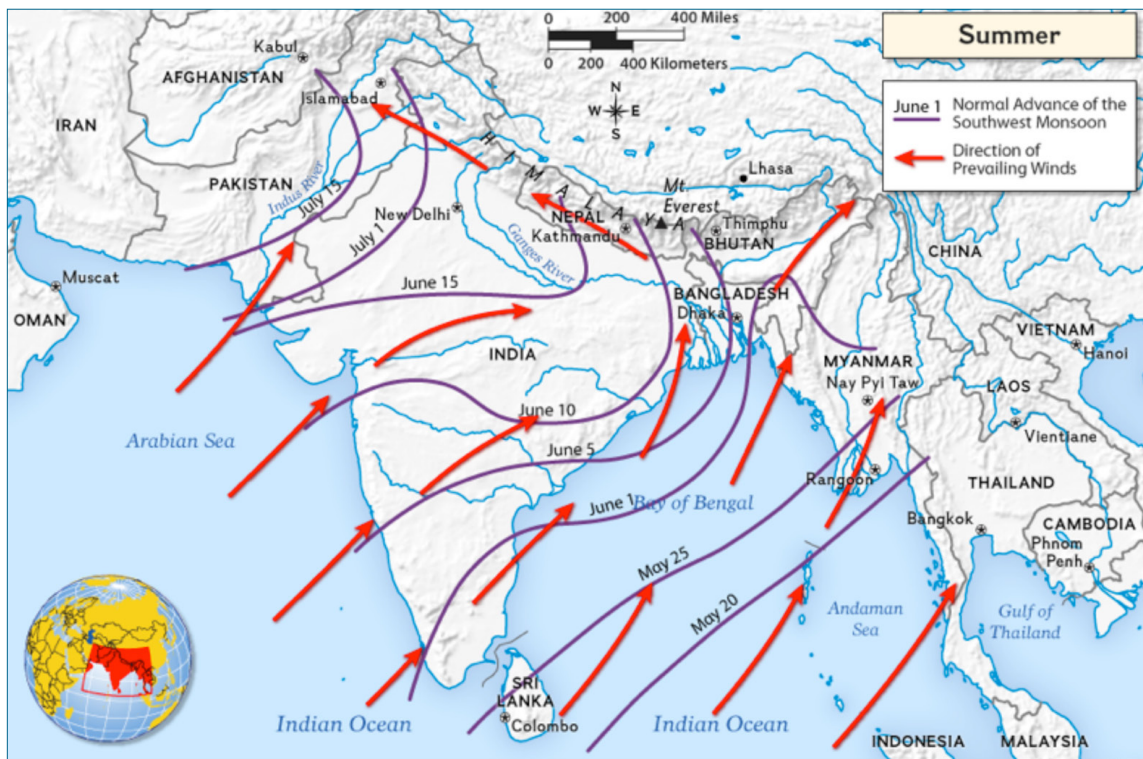
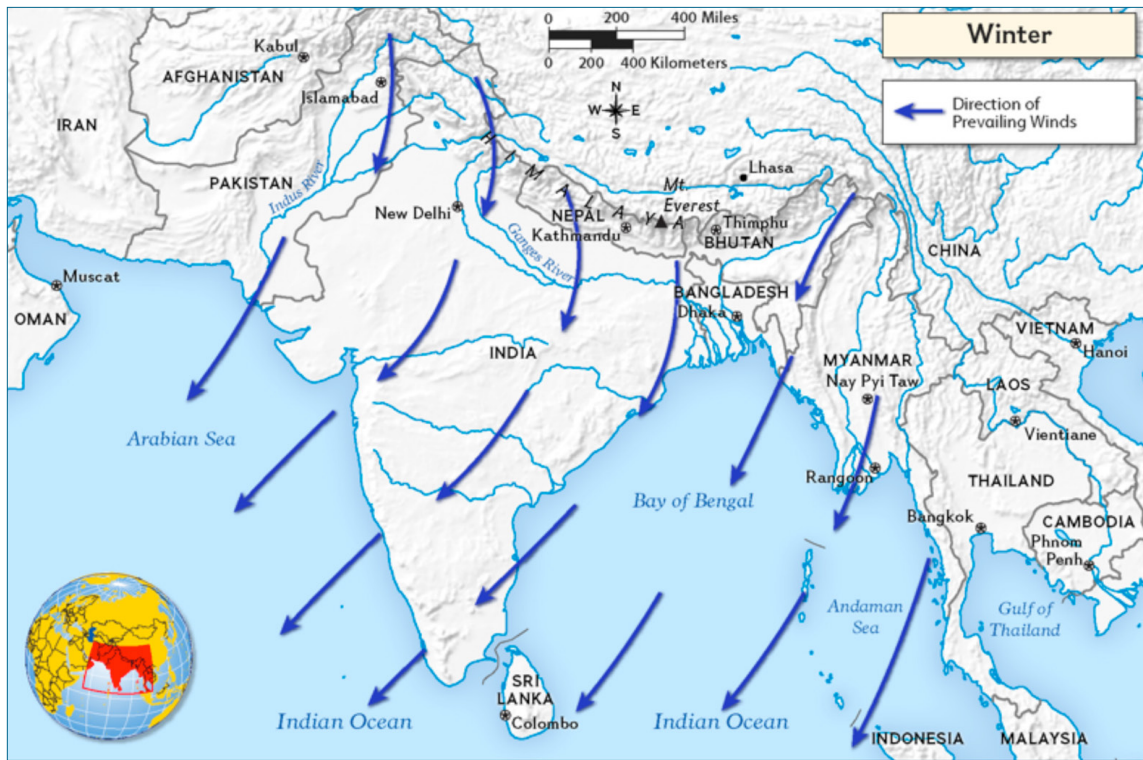
Average temperatures and precipitation: <http://www.worldclimate.com/>

Koppen Climate Classification: <http://geography.about.com/od/physicalgeography/a/koppen.htm>



SOUTH ASIA'S MONSOONS: WINTER AND SUMMER

HANDOUT 1

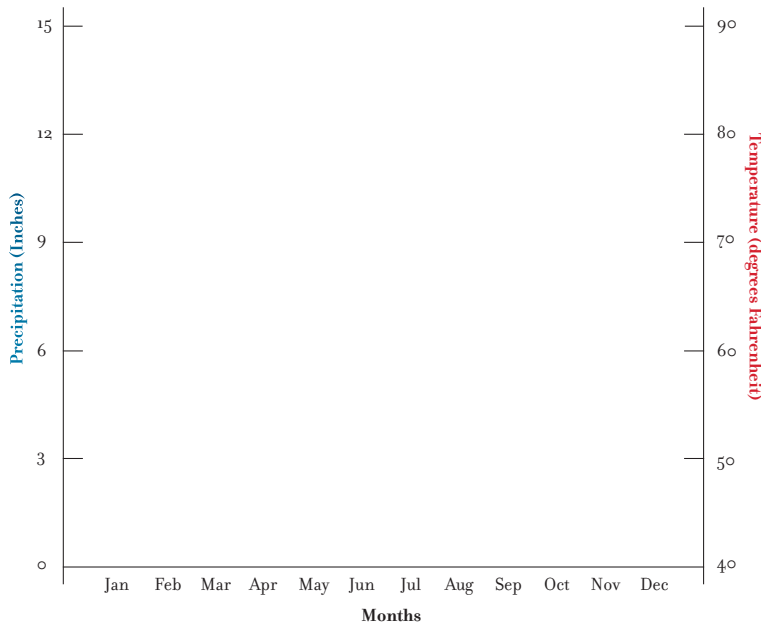


CLIMOGRAPHS OF THE EVEREST REGION

Create two climographs, one of Kathmandu, Nepal and one of Lhasa, Tibet (China). Use the data in the charts below each graph. Climate graphs combine *precipitation* data in a bar graph with *temperature* data in a line graph. Add data to the chart as points, then draw bars from the bottom of the graph to the points for precipitation. For temperature, connect the dots as a line.

A CLIMOGRAPH OF KATHMANDU, NEPAL

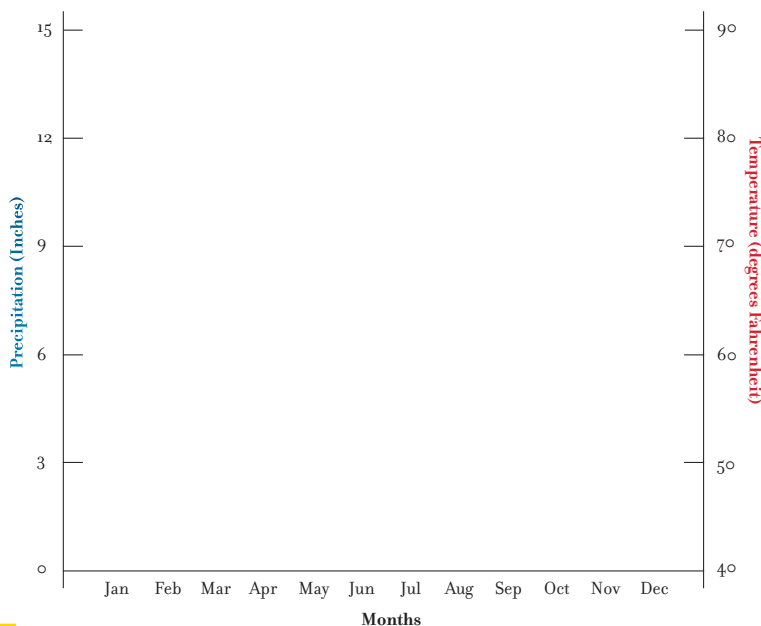
Elevation: 1400 m Absolute Location: 27.70°N 85.30°E



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Precip. (inches)	0.7	0.6	1.2	1.5	4.0	7.9	14.8	12.8	7.4	2.2	0.1	0.4
Temp (°F)	49	55	62	68	73	75	75	75	74	68	59	53

A CLIMOGRAPH OF LHASA, TIBET, CHINA

Elevation: 3658 m Absolute Location: 29.70°N 91.13°E



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Precip. (inches)	0.0	0.1	0.1	0.2	0.9	2.8	5.2	5.0	2.3	0.4	0.1	0.0
Temp (°F)	30	34	41	47	55	62	61	60	57	49	39	32

CLIMOGRAPHS OF THE EVEREST REGION

Analyze the climographs created on page 1 to answer the following questions.

1. Which is the wettest month in Kathmandu? _____ Lhasa? _____

2. Which is the driest month in Kathmandu? _____ Lhasa? _____

3. What is the average temperature of the hottest month in Kathmandu? _____ Lhasa? _____

4. What is the average temperature during the coolest month in Kathmandu? _____ Lhasa? _____

5. What is Kathmandu's climate? Describe the average precipitation and temperature throughout the seasons.

6. What is Lhasa's climate? Describe the average precipitation and temperature throughout the year.

7. Do you notice a relationship between precipitation and temperature in either location? Describe.

8. How might Kathmandu's and Lhasa's precipitation and temperature patterns differ from Mount Everest?

9. Why do you think these two locations were chosen to compare? How are they different? Similar?

10. How might elevation affect the climates of Lhasa and Kathmandu? And Mount Everest?

