

Introductory Geology

Lab: All About Floodplains

Introduction: Topographic association suggests that floodplains have something to do with rivers – since most floodplains are right next to rivers. In today’s lab exercise, we will explore the properties of a floodplain and analyze how the floodplain has been built and is evolving.

Before the lab, read the section in your text about stream processes. Come to lab dressed for the weather, with shoes or boots that can get wet and muddy. Bring your lab notebook, hand lens, a calculator and a water bottle.

Instructions:

After laying out a 50 meter tape across the floodplain perpendicular to the riverbank, we’ll divide the class into small groups to do this lab. Five groups will make soil cores at different sites in the floodplain. One group will survey the topographic profile of the floodplain. A seventh group will map a sketch map of the area around the topographic profile.

A. Describing floodplain sediments.

Each group describing floodplain sediments should have: an auger, a tape measure.

Use the auger to lay out a core of material along the ground next to your site along the tape. Note that the barrel of the auger is about 30 cm. long. When you’ve worked the auger into the ground to the length of the barrel, carefully bring it up to the surface and extrude the material carefully along the ground. Insert the auger into the hole you’ve created and core down for another 30 cm. Bring this material to the surface and extrude it next to the material from the first core. Continue working your way down the hole until you’ve reached the end of the auger shaft. At this point, you should have a strip of extruded material with one end being the material nearest the surface and the other end being the material furthest down in the hole. As you core and extrude, periodically compare the length of the hole to the length of the extruded material on the ground. Chances are, the extruded strip of material will be longer. Scrunch the material together so that your strip on the ground is the same length as the depth of the hole.

When you’ve finished augering and extruding, lay your tape along the strip of sediment on the ground (with the zero end at the ground surface material). Examine the sediment (using eyes and fingers) for places where its character changes. You may see color differences (sharp or gradational boundaries), differences in grain size, in stickiness, in the way the sediment breaks apart and other characteristics. Place a marker, like a small twig at each of the boundaries between different material types (if the boundary is gradational, put the twig at about the centerpoint of the gradation). In your field notebook, draw a columnar diagram showing the augered material to scale with the boundaries shown. Now describe each of the types of materials between the boundaries. If you have time, visit the other augered holes and make a similar columnar sketch and notes (the other groups will have their tapes laid out next to the material and will have marked the boundaries).

B. Surveying a topographic cross-section

Follow your instructor's suggestions carefully, because elevation differences across floodplains are slight, but important to understanding floodplain structure and evolution. First, use a compass to measure the azimuth of the tape line perpendicular to the stream banks. You want to make a three column table in your notebook. The first column is distance along the ground surface – which can be read from the fifty-meter tape stretched out on the ground. The second column is the reading from the survey rod. The third column is the relative elevation at each position along the tape.

If you are surveying the topographic profile with surveying equipment (such as an automatic level, tripod and rod), set up the tripod and level at a place where you can see all or most of the tape line and which is on a higher topographic area (note that you do not need to set up right on the line as long as you can see all of it). Measure the instrument height with the rod and record it in your notebook. Now, one person should take the rod to about ten to fifteen points along the tape. At each point, another person should read the value on the rod at the intersection with the middle (long) crosshair in the telescope. A third person can record the data – distance along tape and reading on the rod (in the first and second columns of the notebook). For the third column, subtract each of the second column values from the instrument height. The third column is now elevations below and above the ground surface where the tripod is.

If you are surveying with a hand level and survey rod, the procedure is much the same, except that your eye height is equivalent to the instrument height. Again, record the position along the tape in the first column, the position on the rod at eye level in the second column, and the instrument height minus the second column value in the third column.

If possible, your topographic profile should include the section of the cross-section from the edge of the water in the river to the top of the bank, as well as the floodplain.

C. Making a sketch map

Students in the sketch map group should walk along the top of the stream banks and across the floodplain, noting areas of higher and lower elevation, significant features such as breaks in the river banks, large trees, areas of ponded water, etc. Once you've walked the entire area and decided the features that are important to map, use a compass to situate the features correctly on a sketch (done as if from a plane, looking down on the area). Add the line of the cross-section to the sketch map in its approximate position. Be sure to include the course of the river or stream, add a north arrow, an approximate scale and a legend to identify any symbols you have used. Putting it all together

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Towards the end of the lab period, each group will have a chance to report on their findings. Everyone will visit each of soil coring sites for an explanation of each individual core. Then the groups that made sketch maps and surveyed the cross-section will report on their findings. All of the material will be available in the electronic course folder for you to review while writing your report.

As you put together your report on this lab, consider the following questions:

- How does floodplain material vary with position from the river?
- How do the various materials in the floodplain cores form?
- What is the relationship between topography and material properties?
- What are the main landscape features of the stream-floodplain system and how do they form?
- How do stream banks and floodplains vary along the course of the river?
- What are terraces?

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