The University of Texas at Austin
Environmental Science Institute

Exploring Alluvial Formations

Lesson Plan for Grades: 8th grade middle school science or lower
Length of Lesson: 50 minutes

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Date created: 05/15/2020

Subject area/course:

- Geography & Geology

Materials:

- Projector
- Laptop
- Large waterproof box that is longer than it is wide and can be punctured
  - It can be a box or a tall lid as long as it has at least a 6 in lip.
  - If you only have a cardboard box, line it with a plastic bag so water won't seep through.
- Pre-mixed soil with sand, pebbles, slightly larger stones
- Water hose
- Preferably done outdoors because of the water drainage
- Handout

*If done indoors in a science classroom there should be a hose attachment for water faucets so experiment can be done using the sink as a water source and also as a drainage reservoir.

TEKS:
§112.20

Process:
(2) Science, as defined by the National Academy of Sciences, is the "use of evidence to construct testable explanations and predictions of natural phenomena, as well as the knowledge generated through this process." This vast body of changing and increasing knowledge is described by physical, mathematical, and conceptual models. Students should know that some questions are outside the realm of science because they deal with phenomena that are not scientifically testable.

Content
(9) Earth and space. The student knows that natural events can impact Earth systems. The student is expected to:

(C) interpret topographic maps and satellite views to identify land and erosional features and predict how these features may be reshaped by weathering.

Lesson objective(s):

- Students will be able to identify land and erosional features.
- Students will be able to predict how weathering reshapes land and erosional features.
- Students will be able to model weathering, erosion, and deposition.

Differentiation strategies to meet diverse learner needs:

- Teacher will give instructions in multiple formats: handouts, larger print on the board, verbally, and through model examples.
- Teacher will allow students autonomy in job assignments while still ensuring all student participation.
- The elaborate section allows students who grasp the concept to move forward. Students who are struggling to continue to collaborate with their partners to discuss the idea further.

Exploring Alluvial Formations

ENGAGEMENT (5 minutes)

- Teacher introduces the topic of exploring Mars and asks students if they have heard of the past Mars Rover projects.
- Asks student to turn and talk to their shoulder partner.
- Project the video "NASA's Next Mission to Mars: Searching for Life on the Red Planet" from 11:00-12:30 and 40-43 minutes: https://youtu.be/Kk6ebXQk73M

EXPLORATION (20 minutes)

- Teacher goes over instructions on how to construct an alluvial fan (see *Teacher Handout*), and expectations of what should be observed.
- Divide students into appropriate number groups.
- Students will set up their model of an alluvial fan.
- Students start experiment and take observational notes guided by the *Student Handout.*

*If this is done in a classroom position drainage end at the sink.

EXPLANATION (15 minutes)

- Gather back as a class and discuss observations.
- Allow students to go around the room or area and see each group's end product and the group could summarize their observations that led up that point.
    - Discuss what students notice at each different groups alluvial plain/fan.
        - Variation of angles and water flow alone will most likely produce different end products, not accounting for different sediments.
- Clean up time.

ELABORATION (10 minutes)

- Discuss the difference between an alluvial plain and alluvial fan.
    - Alluvial plain: is a largely flat landform created by the deposition of sediment over a long period of time by one or more rivers coming from highland regions.
    - Alluvial fan: Alluvial fans are triangular-shaped deposits of water-transported material examples include the alluvial fan of Death Valley, California.
- Discuss the application of this knowledge relate to what Dr. Goudge talks about in his video.

EVALUATION (throughout entire lesson)

- Teacher will conduct formative assessments during the lesson by walking around and leading discussions with each group.
- Each group will present twice and turn in a packet with their data, calculations, answers to the discussion questions.

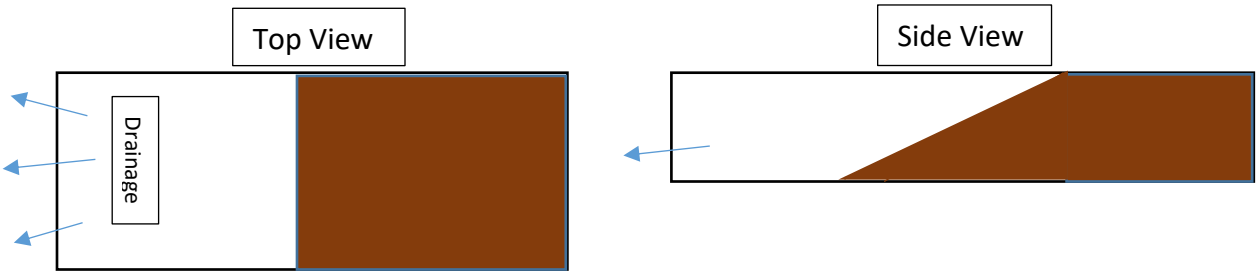
SOURCES AND RESOURCES

- Dr. Tim Goudge's *Hot Science - Cool Talk #123 NASA's Next Mission to Mars: Searching for Life on the Red Planet*: https://youtu.be/Kk6ebXQk73M
- Alluvial fan: https://www.youtube.com/watch?v=lq2VAD39GgE
- Formation of an alluvial fan: https://www.youtube.com/watch?v=-9QE7ndb0Gg

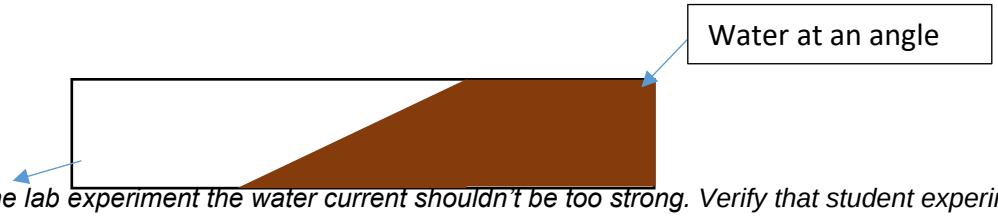
Exploring Alluvial Formations

Teacher Handout

Exploration (20 min)



When filling the box, make sure you add soil to fill about half of the box, shoveling soil to one side to make an incline. The incline models an area of land that starts at sea level and increases altitude as you move up it. Once you have your hill created, start your water hose and raise it to a rate that simulates a calm stream.



**Note for the lab experiment the water current shouldn't be too strong. Verify that student experiments are utilizing the correct water pressure to simulate the formation of the elements of the lesson.*

Elaboration (10 min)

Discuss the difference between an alluvial plain and alluvial fan.

Discuss the application of this knowledge to what Dr. Goudge talks about in his video.

Alluvial plain formation with a slight inline. Students will observe what type of alluvial plain will be created and what path the water will choose to flow. And see what erosion will happen on flat surface over time with the obstruction like pebbles in the way. Over a long period of time, this could create channels that water flows very fast through, picking up a lot of sediment and slowing down deposit. When the rushing water carries alluvium to a flat plain, an alluvial plain will be created by the deposition of sediment over a long period of time.

If the students use the sand to build the structure of a crater. Water will create the erosion. As the stream goes inside the crater, it leaves its channel to spread out and creates a triangle shaped deposit called alluvial fans. The Jezero delta deposit in Dr. Goudge's talk is an example of alluvial fan of sediment deposited by an incoming river.

Exploring Alluvial Formations

Student Handout: *Alluvial Plain Formation*

Experiment Setup:

1. Take your box and get the soil mixture. Fill it with soil so that half is full when looking overtop, but make sure that the soil is at an incline.
2. Make sure that when placing the soil that the soil is not at the drainage area.
3. Once the soil is set up, start your water.
4. Make sure that your water is following the angle of incline so that it simulating a river flowing downstream.

Observations every 5 minutes:

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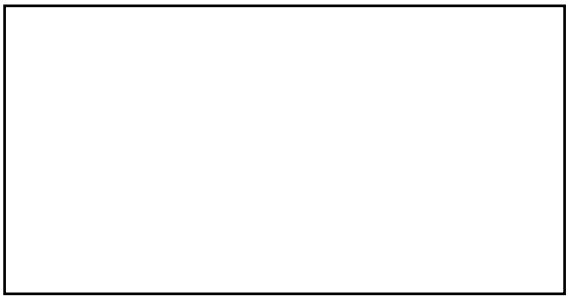

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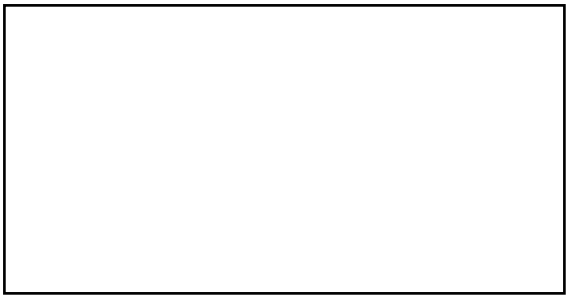

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