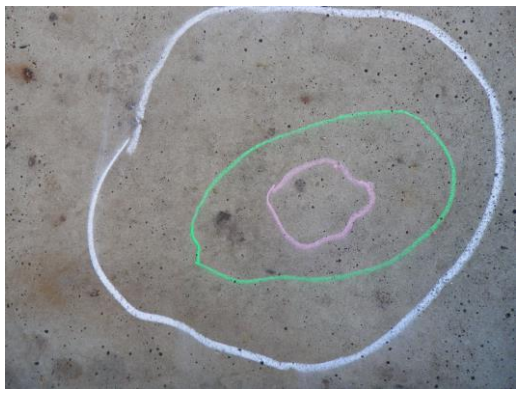
Short and Long Term Changes in Landscapes - Teacher's Notes

Puddles – Student Activity



Students can either use real puddles out in the yard if it has rained or can create puddles on a dry day by pouring about 100ml of water over an impermeable surface such as concrete or asphalt. Since the rate of puddle disappearance depends on the volume of water, temperature and humidity it will vary with weather, season and locality. This puddle evaporated over 4 hours on a windy winter day (about 20°C). Chalk marks were made at 1-hour intervals.

Option 1: For teachers who have this class over 1 day

Materials

- Bucket of water to create several puddles.
- Sticks of chalk.
- A clock.

Method

Students draw around the outline of their puddle early in the day and return at regular intervals to note what has happened to the puddle shape and size.

Questions for discussion

1. Why did we draw round the puddle first thing? To mark the original size
2. What will happen to the puddle? It will dry up/evaporate.
3. What senses will we use? Our sense of sight.

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Conclusion
Students discuss whether what they thought would happen was the same as what did happen.

1. Where did the water go? Into the air. Heat from the Sun evaporated it.
2. How long did it take for the puddle to disappear? In the case above 4 hours
3. Did this change take a long term or a short term? Short term

Option 2: For teachers who only have this class for 1 session per week. Use the photograph above to discuss changes over 1 day.

Salt Lakes – Student Activity

Lake Ballard *The product of thousands of years of evaporation*

In many areas of Western Australia soil naturally contains quite a lot of salt. The salt is the product of millions of years of weathering of rocks and also salt brought in by winds from the sea. When the climate started

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warming up about 100,000 years ago, major north-south rivers in the inland started drying up leaving the long strips of salt lakes we see on maps and from airplanes. When it rains water still flows underground along these drainage channels bringing more salt with it. In the Goldfields region groundwater is hypersaline (saltier than the sea). It will kill most vegetation and is not tolerated by most animals.
Natural vegetation such as trees, bushes and grasses take water and dissolved salt from the upper layers of the soil. This maintains the low salinity and fertility of the topsoil. Clearing for agriculture and building means salty water can now rise to the surface and deposit salt there. This ruins the land for agriculture and building. Western Australia has a major salinity problem. Salt scoured land can be reconditioned by planting salt tolerant plants such as "Old Man Saltbush" which is native to this area.

"Salt can sleep comfortably in the land for thousands of years but when something disturbs the monster.." Jim Heath

We use the dry lakes as a source of salt for food and chemical production and also for gypsum to make plaster for walls, ceilings and broken limbs. Lakes may form in less than ten years if vegetation is cleared. They become progressively salty as later rains sink into the ground, dissolve more salt and bring it to the surface.

Materials

- A take away container, saucer, bowl or bottom of an old cool drink bottle
- 2 tablespoons of salt
  (1 tbs gypsum may also be added)
- 6 tablespoons of damp (not wet) sand

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- Water and Pasteur pipette or straw
- Something to raise up one end of the container

Method

1. Two thirds fill the bottom of the container with sand
2. Add salt to the sand and mix well. Students should landscape the surface into a valley shape as above.
3. Pour about one cup of water gently into the sand in the container. The sand should be damp but not wet.
4. Leave on a warm window sill or outside where it is very dry
5. Over several weeks use the pipette or straw dropper to "rain" onto the land whenever it dries out.

Questions for discussion

1. What did the sand look like at first? Depends on sand or soil used.
2. What changed? The damp sand developed a thin white crunchy salty crust especially at the foot of the valley.
3. What happened when we dropped rain on the crust? It disappeared but the lake at the bottom of the valley became progressively saltier.

The "lake" above took two weeks to develop during winter. The salty crust could be seen and felt after one week.

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Please note that salt is "deliquescent". This means that it can absorb moisture from the surrounding air and the dry salt lake will become liquid again. This is why we sprinkle salt on spilt red wine to stop staining!

4. Would it take a long time or a short time to make a crust as thick as the school is high? A long time. Hundreds and thousands of years

Land can become salt scoured (salt at the surface) over ten years but a salt lake takes much longer to accumulate the vast deposit of salt.

Teacher talk

Teachers used to be known as "chalkies" because they used chalk on the blackboard. That chalk was pure calcium carbonate and was soft enough to leave a good white streak. It was imported from the great chalk deposits in Europe. To demonstrate the production of the gas carbon dioxide, a chalky would just have to drop some blackboard chalk into vinegar and it would effervesce beautifully. Not so now! Most Australian blackboard chalk has a high percentage of gypsum in it. It makes the "chalk" less dusty and harder leaving a clean line. However it means that it doesn't react well with vinegar and gas production is very disappointing.