**Using a model to simulate oil pollution**

This activity was developed by Hayley Beaumont, Pukekohe High School.

**Levels:** 7-8  
**NoS achievement aims:** Investigating in science   
**Contextual strands:** Material world   
**Topic:** Environmental studies

**Rationale**

Hydrocarbon compounds can disperse across the surface of the water.

Oils spills are difficult to clean away and are deadly to many living things. The effects of oil spills are upsetting to students and to scientists alike. Models can be used to investigate oil spills. At this level students should be developing their understanding of the relationship between investigations and scientific theories and models.

**What you need**

* News items of oil spillage disaster at sea (for example, internet and newspaper articles, videos).
* For each group:
  + a large shallow pan or tray (square if possible)
  + water
  + heavy machine oil, for example, dirty automotive oil
  + drinking straw or electric fan (to simulate wind)
  + string
  + a glass ‘wave-maker’ plate which fits into the end of the pan (optional)
  + sand and rocks to make a ‘shoreline’ (optional).

**Focus**

* Why can’t oil be washed away like some other substances?
* Detergents are used to remove oil spills in the home. Why aren’t detergents used in oil spillages at sea?
* Scientists use models to think about oil slicks. What aspects are observable/ ‘concrete’? What aspects are at the level of mental models?
* How could we model the behaviour of oil spills on water, so that we can accurately track and describe changes in the slick?
* What environmental features should be represented in the model? Are there any that can be disregarded? If so, why and on what grounds?

**Exploration**

1. As a class, look at and discuss the oil spillage disasters. Get students to share their ideas about how the environment (wind, waves, and coastline) affects the oil spill, and how the oil spill affects the environment.
2. In groups, get students to:
   * pour water into the pan so it is two-thirds full
   * gently add a small amount of oil
   * loop the string around the ‘oil spill’
   * mark the length of the looped string, measure it, and record the length on a data table
   * wait 3 minutes, then repeat the string measurements and make any observations.
3. Get students to repeat steps 3 through 5 for a total of six readings.
4. Next, have them:
   * use the straw to lightly blow from one direction on the spill to spread it out (if using a fan, exercise caution)
   * record observations
   * repeat the ‘blow and record’ process every three minutes. (If the spill covers the entire pan, start again.)
5. Get students to:
   * shake or vibrate the pan (or use the wave-maker) to create light wave action
   * record observations
   * investigate answers to the questions: If left alone, how does the oil spread out? What effects do waves have on the spill? What is the effect of wind?
6. (Optional) Students could also:
   * make a ‘shoreline’ of sand and rocks
   * record observations of the effects of oil on these materials.

**Reflection**

* In what ways is the concrete model the same as or different from the real world context?
* In what ways do ‘concrete’ models help us develop mental models?
* What other sorts of models might scientists use for the behaviour of oil slicks on water?
* In this activity, we developed a model to help us understand the behaviour of oil spills on water. What other models have you met in your science work?
* Do you think different kinds of oil make different oil slicks?
* How does understanding the chemistry of different oils help us to understand what might happen if they are accidentally spilled on water?