**Effects of silage on a rural stream – case study**

**Introduction**

This commentary relates to a biotechnology unit that focused on investigating silage and the possible effects of run-off on a small rural stream. Read why this was an effective unit and what made it work well. The unit was carried out with two Year 4 classes.

Get unit plan: [Effects of silage on a rural stream](https://www.sciencelearn.org.nz/resources/2009-effects-of-silage-on-a-rural-stream-unit-plan)

**Selecting a problem**

The teachers wanted to use a real-world problem related to biotechnology. The topic had to be real and meaningful for the students, as well as situated in a context with which the students had some familiarity. It was also important that the topic was challenging, engaging, and included an opportunity for learning in the area of biotechnology appropriate to the age of the students.

The topic for this unit, investigating the possible environmental impacts of run-off from silage, was identified by one of the teachers. She had a small farm on the outskirts of the city. Tucked in behind her property was one of the region's many gullies. This area, with its stream and willow trees, had once been a favourite fishing spot with the local children. Sadly, the stream was now blocked and the whole area reeked of decay. Some locals blamed run-off from the old hay and silage storage dump not far from the stream. Others thought the new silage bales and pits positioned around the catchment area may also be to blame. An article in the local newspaper drew public attention to the problem and also caught the attention of staff members at the school. The teachers used this article as a springboard from which to launch student interest and investigation.

**The curriculum**

The topic fulfilled the requirements of a worthwhile Technology Education project. There was clearly a need to be addressed. Also, the problem was situated near to the school. This made the pollution problem meaningful and relevant to the every day lives of the students involved. Silage making was also a biotechnological process and so fitted the criteria for the unit being developed.

**Planning**

The teachers identified learning outcomes that they considered would provide students with opportunities to find out about silage making (biotechnology) how to investigate the health of waterways (science), and also how to develop an information pamphlet in which they could summarise their new understandings (information and communication technology).

The biotechnology of the unit lay in the silage making and the potential for run-off from the silage. The list of learning outcomes (see the *unit plan*) was to guide formative interactions that occurred during the unit. The final outcome, the information pamphlet, was to be informed by these along with other information gathered during the unit.

Although the focus of the unit was learning in **Biotechnology**, the outcome of the unit - an information pamphlet - was in the area of **Information and Communication Technology**. It was important that students used this pamphlet to bring together their learning (including learning in biotechnology). Because of the role of the pamphlet in assessment, planning needed to include opportunities for students to become knowledgeable about the features of a pamphlet and to develop the technical skills to design and construct one.

**Facilitating student learning: Some key messages**

* Identifying real biotechnological activities (in this case, making and storing silage) within the environment of the students is a useful way to find appropriate tasks upon which to base student learning experiences.
* Teacher views of biotechnology will impact on student understanding. Moving beyond existing knowledge and researching the scientific principles that are part of the biotechnology is an essential part of teacher preparation.
* Experts may be available to help teach key concepts (in this case, a farmer visited the class and talked about making and storing silage. She also brought some silage for students to smell and feel; an education officer from the regional council taught students how to measure the health of streams).
* Understanding of the biotechnological concepts needs to be within reach of the students. These understanding may be as simple as understanding that change in materials is brought about by the action of life forms which cannot be seen with the naked eye. Providing a visual image (in this case of microscopic life) is important. It may also be possible visit a local high school and use their microscopes to investigate the existence of microorganisms, for example in a sample of dam water.
* Illustrations, pictures, diagrams and models can help students achieve the desired understandings. Charts that summarise information can be placed up around the walls of the classroom and referred to in later lessons, providing links between concepts.
* It is valuable to link student learning in biotechnology to appropriate hands-on activities and experiences. These concrete experiences support student understandings and provide memorable episodes which can be referred to and reflected on. In the case of this unit, students can make their own silage (get information sheet). A visit from a farmer enhanced student learning by giving them the opportunity to listen to and ask questions of a practicing expert.
* Being alert to students' understandings of the world around them, and particularly those associated with their topic of study, is important in enhancing new understandings. In the case of this unit, some students did not understand the water cycle, so were unable to understand the importance of keeping private waterways clear and clean.