

# From school to lab

**Four Dutch high school students figured out a way of using algae to turn river water in the Gambia into drinking water and nutritional supplements. They got support from Wageningen researchers in writing the capstone project report about their idea in their final year in high school.**

TEXT DIDI DE VRIES

**I**t was very nice to see a real lab and to talk to our supervisors,' says Bram Klein Wentink. Last school year he, Carmen Swiers, Lisanne Peters and Tessa Mennink got a peek behind the scenes at Wageningen University & Research. They did a capstone project about algae with supervision from Ben van den Broek and Dorinde Kleinegris of Wageningen Food & Biobased Research. 'We could ask about anything we wanted and got specific detailed answers which helped us to develop a technically sound water purification system.'

The high school students from Ludger College in the Dutch town of Doetinchem entered the national capstone project competition IMAGINE last year. This competition aims to get high school students interested in life science projects in developing countries. Van den Broek and Kleinegris suggested the theme of algae but the four high school students came up with the application themselves: a water purification system for the Gambia which extracts drinking water and nutrients from river water. Algae convert the nutrients into proteins suitable for human consumption, for example.

The high school students wanted to meet

the needs of Gambians. About 16 percent of the population of the African country are undernourished; clean drinking water is scarce. 'You can also make oil or pigments using algae, but what use is that to people in the Gambia?' explains Carmen. 'Also, we wanted to keep the system simple so you can use it after a short training course.'

'They did a very good job of that practical application,' says Van den Broek. 'They knew a lot about the Gambia and made use of that knowledge in their design.' About the climate, for instance. The sun heats up the water and small windmills create circulation in the tanks with algae. The system was designed for Kerewan, a town of 22,000 inhabitants about 50 kilometres from the west coast of the Gambia on the river Mini Minium Bolon. Purification takes place in four stages in different tanks. The first tank is black. The water is heated by sunlight to 60 degrees Celsius, killing bacteria and viruses. In the second tank Chlorella algae grow which absorb heavy metals such as copper, lead and mercury. These algae are therefore not suitable for consumption. The Spirulina algae in the third tank are edible, however. They absorb nutrients from the river water

and are harvested and then dried. The powder made of them contains proteins, vitamins and minerals and can be used as a nutritional supplement. In the fourth stage of the purification system, the heat of the sun ensures that the water evaporates. The steam is then captured and cooled for use as drinking water.

## TAKING SAMPLES

The project carried out by Bram, Carmen, Lisanne and Tessa is an example of a capstone project done at Wageningen University & Research. Fifth- and sixth-year high school students can get help at the university with getting ideas related to communication, animals, health, climate, people, technology and nutrition (see text box). Writing their capstone project at the university enables students to go a step further in their research than they could if they were supervised solely by their high school. With experiments in the lab, for instance, such as the one Bram, Carmen, Lisanne and Tessa did using water from the Oude IJssel river. 'In the Gambia people use the river as a toilet,' explains Bram. 'To get comparable water we mixed our own urine into the river water, and then we added algae to it.' The students took sam-



**‘We mixed our own urine with river water’**



ples at difference time to see how fast the algae purified the water. They also examined the algae under a microscope. The jury of IMAGINE thought the maintenance and labour costs of the application were too high so the algae system did not win the competition. But Van den Broek and Kleinegris are very satisfied with the results of the project. ‘The nice thing about working with high school students is that they think much bigger,’ says Kleinegris. ‘We focus on research on algae at a high level of detail. They tackle the subject from several different angles, from technology to economics. It’s very nice to see that integrated approach.’ ■

### HIGH SCHOOL PROJECT AT WAGENINGEN

Every year the department of Publicity and Recruitment at Wageningen University & Research helps about 370 secondary school students with the capstone project they complete in their final year. A team of university students is deployed to answer the high school students’ questions. The most popular topics are nutrition and health, biology, chemistry and food technology. Additionally, Publicity and Recruitment organizes five increasingly well-attended capstone project days for high school students in their fifth and sixth years. During these days they work in thematic groups on choosing an interesting topic and formulating a good research question. About 70 high school students sign up for every high school capstone project day. *More information (in Dutch): [www.wur.nl/pws](http://www.wur.nl/pws).*

For questions on a specific topic or help from a researcher, high school students can send an email to the Food Valley Network VO-HO ([betasteunpunt@wur.nl](mailto:betasteunpunt@wur.nl)), who will look for someone from the university who can help.

