



→ Prof Bernard Fourie and Prof Japie Schoeman of the University of Pretoria contributed their expertise to the practical aspects of the project.

Harvard and UP find water transport solution

Prof Japie Schoeman

The human body has perfected the art of efficient water transportation through its cells. So why not use the design of a biological cell to find a solution for efficient water transportation in poor rural communities who have limited access to drinking water?

This is exactly what a group of Harvard students have done. With the knowledge and experience of two academics from the University of Pretoria, the CellBag is now being used by members of the Moretele community north of Johannesburg for their daily water needs.

The CellBag comprises two parts that can easily be connected or disconnected from each other: a bendable water bottle that can hold 1 l of liquid and a semicircle-shaped bag in which food can be stored. When these two parts are connected, the CellBag becomes a conveniently sized round 'bag' – one half is the bent water bottle and the other half is the food bag. The circular-shaped bag has a shoulder sling that enables it to be carried effortlessly.

The idea of a bendable water bottle was inspired by the biological cell that can expand and contract as needed. One can also connect a number of bendable water bottles together to carry up to 10 l of water over one's shoulder at once, almost like a long pipe.

The CellBag concept was first envisioned in 2008 by a group of Harvard University students during a course led by Michael Silvestri, under the leadership of David Edwards, Harvard professor and founder of ArtScience Labs. The idea with the design of the CellBag was for it to be used by communities in arid areas around the world to carry water. The Harvard Global Health Institute, together with the Wyss Institute of Biologically Inspired Engineering, sponsored the conceptual development.

Soon afterwards, the CellBag came to life at the Laboratoire (the home of ArtScience Labs in Paris) with the help of the designer Mathieu Lehanneur.¹

These bags are now for sale in Europe for use by cyclists, hikers, campers and holidaymakers, or just for everyday use. It is in Moretele, approximately 150 km north of Johannesburg, however, that the CellBag is serving its intended purpose. The team from Harvard joined forces with the University of Pretoria's Prof Bernard Fourie, Extraordinary Professor in Medicinal Microbiology, and Prof Japie Schoeman, Associate Professor in Chemical Engineering, to test the use of the product in a South African community.

In Moretele, residents have to walk distances of between 50 m and 1 km to fetch water from a communal supply. They have to fill water bottles and carry them over these distances to their homes for everyday use. Each household uses an average of 50 l of water a day.

In the design stages of the CellBag, ArtScience Labs compiled a questionnaire to ask local residents about their current methods of carrying water to their homes, its storage and quality. This questionnaire was adapted by students of the University of Pretoria to make it relevant to South African conditions.

The residents said that they mostly use wheelbarrows to transport water in 20 l containers from the water source to their houses. This causes back and shoulder problems and general fatigue due to the long



→ These bags were provided to community members for evaluation.

¹ CellBag: Imitate biology, carry water differently. <http://lelaboratoire.org/CellBag%20Presentation%20EN.pdf>.



→ Learners from Mashilo-Matsho Primary School in Moretele tested the water bags in a trial run.

distances some of them have to walk. The containers are often not properly disinfected. Together with the poor quality of the bulk water supply, this may cause health problems.

After the investigation had been completed, a few of these bags were provided to community members to test their response. The reaction was overwhelmingly positive. One resident who received two strings of water bottles in December 2010 is still using them to collect and carry water from a standpipe to his home, saying it is much more convenient and easy to transport than one 20 l plastic container. The users also indicated that they clean the CellBag or string of bottles diligently once a week with a soapy solution, as recommended.

Following these initial promising results, CellBags were recently provided to 50 schoolchildren from Mashilo-Matsho Primary School, a school in the area, where access to clean drinking water is limited. This trial run will further test the

usefulness and acceptance of the CellBag to members of the Moretele community, and as a potential solution to the water transport challenges experienced in many poor rural communities. ➔

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