ECOS
SCIENCE FOR SUSTAINABILITY

www.ecosmagazine.com

Published: 3 December 2012

3-D printing opens access to soil science equipment

While the reality of printing any object on demand may lie in the future, the technology necessary to do it is readily available. Soil scientists are already taking advantage of 3-D printing's possibilities to overcome equipment constraints.

Credit: Eventorbot/Wikimedia, Creative Commons, GNU Free Documentation Licence v1.2

In a recent paper published online in the *Soil Science Society of America Journal*, a team of researchers headed by Philippe Baveye explored the potential of manufacturing soil science equipment using 3-D printing.

They found that the technology, also called 'rapid manufacturing' or 'stereolithography,' has major benefits over traditional manufacturing methods, and they were able to successfully produce intricate pieces. Also, the ability to easily share the designs used by 3-D printers could allow for better replication of experiments and collaboration among soil scientists.

First developed in the 1980s, the process of 3-D printing begins with a computer-generated model [often a Computer Aided Design (CAD) image] that is 'sliced' by a program to create very thin layers of the object.

The printer then uses an extruder that lays down a material – frequently a thermal plastic – layer by layer, as defined by the computer program, to create the full 3-D object. This method is currently being used to build a variety of items, such as mobile phones, jewellery, and artificial limbs.

Baveye's team used the technology to create parts of a permeameter, a device used to measure the hydraulic conductivity of soils. Traditionally, this type of equipment is made using lathes and drills.

However, those techniques are painstaking and time-consuming. Also, traditional methods cannot create intricate

designs or incorporate certain features such as non-concentric structures. Moreover, once a product is made, researchers are resistant to making changes even if the piece would work better if modified.

Baveye and his colleagues found that by using a 3-D printer to create their design of the permeameter parts, they were able to avoid several of these problems of traditional equipment manufacturing.

Many designs that used to be impossible to make, such as intricate conduits, can now be easily worked into the 3-D printing models.

‘Should anyone want permeameter columns with a narrower or larger diameter, designs can be scaled up or down in seconds, and a new piece can be printed without extra human labor,’ says Baveye.

By avoiding the painstaking and backbreaking work of traditional methods, 3-D printing has inadvertently levelled the playing field. While in the past few students and researchers were willing to use the drills and lathes, many more now look forward to the opportunity to create and print CAD drawings.

This technology has opened doors to aspiring soil scientists that may have otherwise passed on the opportunity to create designs and equipment for their research.

An additional benefit of using 3-D printing, and one that Baveye believes could greatly impact soil science, is the ease with which designs can be shared among researchers.

‘CAD files can be easily sent by email to colleagues anywhere in the world,’ explains Baveye. ‘That means experiments can be replicated easily, even if they involve complicated pieces of equipment.’

‘We expect that the evolution of 3-D printing will follow that of laser printers,’ says Baveye. ‘As the price of 3-D printers continues to fall, we expect that they are going to be more and more widely used in soil science laboratories and in many other disciplines.’

Source: EurekAlert!

From **ECOS** online http://www.ecosmagazine.com/?paper=EC12501