In Conversation: Thoughts on the STARS 2019 Conference

How does soil science link to future global challenges?

Harry: When I tell people that I'm doing a PhD on soil, there's often a surprised look that says something like 'why would you want to study dirt?'. It's true that it doesn't have the sexiest of reputations, but soils underpin our food security, our water security, terrestrial biodiversity, and are key sources and sinks of greenhouse gases. The kinds of future challenges that soil science can help solve revolve around feeding a predicted population of 9 billion, finding methods to conserve water in increasingly arid regions, creating natural sinks for greenhouse gases to tackle climate change, and even interplanetary colonisation. You can't survive on any planet for long without soil to recycle air, water and nutrients.

Alex: As Harry has indicated, soils stand to play a vital role in addressing a range of global challenges which go far beyond producing enough food to feed the growing human population. How so, you might ask? Well soil is so much more than dirt! It is often said that a handful of soil can contain more bacteria than there are people on the planet, and bacteria represent only one group of organisms that make up the bustling metropolis beneath our feet... there are earthworms, pseudoscorpions, fungi, mites; the list is near inexhaustible. This diverse community is often responsible for soil fertility as they keep those all-important cycles Harry mentioned ticking over. They also make an equally rich crop of bioactive compounds which can prove useful to humans. For instance, the discovery of antibiotics heralded an enormous advance in global disease control. As we face increasingly drug-resistant 'superbugs' which threaten to reverse decades of medical advance, surely our understanding of soil and its inhabitants has never been more pressing?

How easy was it to interact with other scientists from other disciplines?

Harry: You've picked up on a problem that's not obvious from the outside, but it's a little-known fact that scientists tend to stick to their specialism and are unlikely to venture into other sciences further afield, microbiologists stick to microbiology, physicists to physical explanations of phenomena, and chemists to nutrient flows. Conferences like this force us to play nicely with one another, and the results can be surprisingly productive. Interdisciplinary research is becoming more and more vogue, because it often results in a more coherent and complete picture of natural systems, and therefore it can be more applicable to policy makers and land managers. To get to your question, I find it tricky because it forces you to rethink and explain your research in more layman terms, you can't fall back on shared knowledge or even technical terms. Everything has to be unpacked. That being said, it's a great practice and the proceeding conversation can highlight questions that you might have never thought of in the first place.

Alex: Firstly I would like to explain why early career researchers might not engage across disciplines as frequently as you might think. Before I even started my PhD I was shown a diagram that summarised how as the depth of your knowledge increases, its corresponding breadth decreases, and so you can quite easily end up in an intellectual bubble. This specialisation is quite necessary, as no one wants to be a Jack of all trades and a master of none. However scientific challenges, especially those involving soil, can't be resolved or even properly understood without an appreciation for the interdisciplinary approach. While I agree it can be tricky for the reasons Harry has mentioned, I would also say that as our collective knowledge has increased interdependencies between disciplines have become more and more apparent. Disciplinary boundaries have therefore begun to dissolve, so much so that a microbiologist can excitedly join a physicist in conversation about soil-pore connectivity and consider how it impacts the migration of microbes through a soil profile, while a chemist might chip in now and then about the sorption of various pesticides in different soil textures and so on.

Which events do you find the most rewarding?

Harry: Although is great to see what other PhD students are doing in terms of formal presentations and posters, I actually prefer the chatting over dinner or a pint. Because people are much less guarded, and you can get a real feel for their science. After all science is done by people, and so once in a while it's nice to scratch the surface and see what makes them tick. If I had to pick a format it would be the workshops. I like how they force us to think about policy, philosophy, and communication, and you don't normally get to explore those aspects in your everyday.

Alex: I found the panel discussions were not only an excellent forum for multi-disciplinary debate, but also a great opportunity to hear a range of opinions from across a wide spectrum of ages and career stages. As Harry has said, science is done by people, although as a whole the research community has often had to grapple with the problem of appearing impersonal and remote. It is therefore great to hear people's opinions in a panel. That being said, there is still a layer of formality in a panel discussion which can dissuade some people from speaking completely freely. On the other hand, a chat over a pint usually doesn't benefit from the same level of structured direction that a good chair can provide!

Harry and Alex are members of the third and second STARS cohort respectively. Harry is studying the influence of historical management and soil moisture on N_2O emissions from grasslands and Alex is investigating antibiotic resistance in dairy farm field soils. You can find out more about their projects and other STARS students here: http://www.starsoil.org.uk/people/