Water and bioenergy

Water management expert Arjen Hoekstra, together with environmental science and energy specialists, has analysed the impact of increasing the use of biofuels in the transport sector on global water demand.

What was the impetus for this project? What was the main objective of the work at the beginning of the project?
The main goal of this research was to couple water management with energy and climate change scenario analysis. The debate about moving towards sustainable energy as a strategy to fight climate change, with an emphasis on biofuels, lacks considerations of water. In this study we looked at the water impacts of developing scenarios of increasing biofuels use in transport for the year 2030 globally. We tried to evaluate energy scenarios in terms of water demand and water scarcity, which has never been done this far before. We adopted the water footprint — which calculates the amount of water needed to sustain a certain consumption pattern — as the key indicator. The water footprint bridges between water use and scarcity on the one hand, and economy and consumption patterns on the other hand. Its use in the climate change debate has been very limited until now, and we are trying to fill this gap with our research.

How did you go about finding suitable collaborators?
A few years ago I took the initiative to explore the possibility of collaborating with energy experts at the University of Twente, where I lead the water management group. We ended up establishing a cross-collaboration with the thermo-engineering group led by Professor Theo van der Meer. The two research groups were developing their own research agenda independently, but since the initial conversations took place, we have started to join efforts, with one assistant professor, Winnie Gerbens-Leenes, working in both groups.

Did you encounter any difficulties in working with a team of experts with different research backgrounds?
No, I didn't. Although it was quite a bold step for two unconnected research groups in the same institution to start working together, we agreed on the research questions from the outset and this helped the collaboration tremendously. On both sides there were open minds about exploring new avenues of research.

What was the highlight of working with an interdisciplinary team?
I found it a particularly rewarding experience having a student in the team for this research work. Students don't have those disciplinary borders as much in their minds as established researchers have. Sander van Lienden brought to the team a remarkable enthusiasm for pulling the different expertises together.

Any surprises?
Not really. Our hypothesis was that the water footprint of a significant increase in biofuels could be substantial, and this is what we concluded. However, we were a bit surprised to find that for some countries, some of the scenarios for biofuel demand could become unrealistic. Actually, in some cases the water demand associated with the increased production of biofuels would rise too much to make that level of production possible, provided that the countries meet their own biofuels demand internally. Things of course change if they can import biofuels from abroad.

Did you learn any lessons about interdisciplinary collaboration from this project that would benefit others trying to do similar work?
The lesson for all of us involved in this research is that, when you do interdisciplinary research, you have to prove yourself in the different disciplines, because often you are evaluated by reviewers with a strong disciplinary background, with a clear framework in their mind. You have to make sure that you are well established and grounded in each discipline. One way is getting published in different disciplinary journals. In our case in particular, we need to be represented in both energy and water journals, meaning that we need to use terminology and methodologies accepted by those two different communities.

Was it difficult to get financial support?
For this specific project it wasn't difficult. There was no external funding; it was just the University of Twente supporting us. More generally, we have found that when applying for funding calls, national research bodies, such as the Netherlands Organisation for Scientific Research, are still quite conservative and very much disciplinary oriented.

Any final thoughts?
Climate change will often affect a human society through water. Both impact studies and discussions about climate change mitigation will have to include water considerations. We need climate and water scarcity solutions that address freshwater and energy demands at the same time, and this is, I think, the big agenda for the future.

INTERVIEW BY MONICA CONTESTABILE

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