Connecting the two cultures

Matthias Langensiepen - Bonn, June 2021

On 7 May 1959, the English novelist and physical chemist Charles Percy Snow delivered a Rede Lecture at Cambridge on the divorce between science and humanities which he published in the same year in an often cited book titled “The Two Cultures and the Scientific Revolution” from which the following excerpts are drawn (C.P. Snow 2012):

“A good many times I have been present at gatherings of people who, by the standards of the traditional culture, are thought highly educated and who have with considerable gusto been expressing their incredulity at the illiteracy of scientists. Once or twice I have been provoked and have asked the company how many of them could describe the Second Law of Thermodynamics. The response was cold: it was also negative. Yet, I was asking something which is about the scientific equivalent of: Have you read a work of Shakespeare’s? I now believe that if I had asked an even simpler question – such as, What do you mean by mass or acceleration, which is the scientific equivalent of saying, Can you read? – not more than one in ten of the highly educated would have felt that I was speaking the same language. So the great edifice of modern physics goes up, and the majority of the cleverest people in the western world have about as much insight into it as their neolithic ancestors would have had.”

He concluded: “This polarization is sheer loss to us all. To us as people, and to our society.”

What I experienced during the last three years reminded me of this lecture.

My core experience is in radiation and heat physics of plant communities and the biological regulation thereof. I also studied agronomy of the tropics and developed a good understanding about the relation between natural and applied science. A dear colleague introduced me to Africa about 15 years ago and I became increasingly aware about the importance of studying human-land relations in understanding rural socio-ecologies since then. Having been educated by humanists influenced by the Weimar culture, I don’t see a contradiction in studying human and material realities in tandem. My interest in actually practicing this integrated research rose over the years and eventually motivated me to join the collaborative research center ‘CRC Future Rural Africa‘ at the Universities of Bonn and Cologne three years ago.

Having good knowledge in applied mathematics, statistics and model development, I was asked by the CRC to apply quantitative models for simulating agro-futures in the Kilombero valley of Tanzania using data from agroeconomic household analyses, hydrological investigations and rice agronomic studies. I hoped for fruitful discussions with colleagues from the anthropology and geography departments on how to apply this work in investigating rural African futures. Instead, they persistently criticized me for this work saying that realities can be only socially constructed, futures are unpredictable and quantitative modeling is inappropriate for characterizing future-making in rural Africa. I am not concerned about these kinds of responses as they appear to be part of their culture.

Are quantitative facts not important in future-making? Is there a future without science? What does science mean to our society? Scientific facts are value-free. Does this imply that science is of no value to the highly diverse societies of our world? My answer to the last question is a resounding no. I felt the need to demonstrate with my own work how useful the connection between the two cultures can be for our futures.

A quote of Warren Buffett came to my mind: 'The most important thing to do if you find yourself in a hole is to stop digging.' That is what I did in spring 2020 and embarked on a hugely interesting intellectual journey. The Covid-19 pandemic with travel bans, associated interruption of field research in Africa, resulting lack of field data for calibrating and validating established models for scenario analysis, and confinement to my home office for more than a year facilitated this fascinating journey I will never forget.

What did I do? I am convinced that Africa has no future without science. Plant molecular biology and physiology is a treasure trove of solutions largely underutilized in agricultural development in rural Africa. Together with 11 plant physiologists from different countries I first developed a framework for translating plant molecular biology into agronomic research practice. This necessarily required a 'science with people' approach which motivated us to develop a transdisciplinary mindset to facilitate such exchanges. The framework we propose offers numerous possibilities for improving agroecologies in Africa in the future, but who is actually shaping futures and how?

My colleagues at the Future Rural Africa CRC claim that realities and futures can be only socially constructed. This motivated me to study literature on socio-anthropology. To my own surprise, I could follow their argument but still missed the connection to realities of the material world. After extensive reading, partially discovering inspiring work for which I developed great respect, it dawned to me that anthropology and other humanities are still largely demarking themselves from science. Being pragmatic, I stopped following this thread and shortly delved into the literature on human geography, hoping to find a methodological approach for studying future-making but to no avail.

I finally concentrated on cognitive psychology for which I have a long interest since having explained the cognitive basis of mathematical reasoning to students of agronomy and biology in a course on quantitative model development I had taught at Humboldt-University of Berlin in the 2000s. This led me to the exciting realization that futures are first and foremost shaped in people's minds and nowhere else. So if I wanted to understand how agrofutures are shaped in rural Africa, I first had to develop a method for eliciting mental models of future imagination from farmer's minds. Being a trained farmer myself with plenty of experience in communicating with African farmers I did not see any obstacle for conducting such interviews in cooperation with professional cognitive psychologists and linguists. The next step would have been to characterize the evolution of social future-making processes resulting from individual future imagination and social interaction. Characterizing futures without an understanding of human interrelations with the material world would be incomplete however. A transdisciplinary research framework, blending anthropological, cognitive-psychological and scientific methods of investigation, was required for this purpose. I developed such a framework last year.

Developing a decision-framework for balancing human needs with wetland conservation in East-Africa was the next project at the interface between the two cultures which turned out to be even more challenging than the previous work. It is based on two wetland projects in East-Africa in which I served as a PI and integration scientist. My major role was to translate the findings of different disciplines into a decision tool for environmental and agricultural policy-makers at the government level with whom I extensively interacted in Uganda, Kenya, Rwanda and Tanzania.

The key lesson I learned during this work was that facts are meaningless to environmental policy-makers as long as scientists do not interpret them in concrete political, social and ecological contexts relevant to them. Developing a useful framework required an extensive literature study on various aspects of wetland socio-ecologies, decision-theory, policy-process theory, ethics, valuing, framing, linguistics, data science, and interaction and information design. Developing a generic, flexible method for an ethically responsible, pluralistic and meaningful valuation of wetland socio-ecologies in East-Africa turned out to be the largest challenge I had to tackle. I am currently discussing the solution and implementation with environmental policy-makers in East-Africa.

With these three frameworks on integrating plant physiology, investigating future imagination of East African farmers and supporting policy-makers in East-Africa in environmental decision-making I would like to demonstrate that cooperation between the two cultures is useful for solving one of the greatest problems of our future, sustaining plant production for a rapidly growing world-population in times of global change.

Nature and humans are deeply entangled, and so must be science and humanities.

Is there a reason for further cultivating the divide?

A scientist’s duty is to seek truth in the name of society.