12 QUESTIONS TO ...

... GABRIELE BAMMER

1. From your point of view, what are today's most pressing environmental problems?

An overarching pressing challenge is how to effectively tackle complex problems, many of which need urgent attention, including in environment, security, public health and education.

There's an imbalance in the two parallel research approaches needed. One approach is to drill down into such problems to understand pertinent aspects in great detail, and there is an impressive array of sophisticated reductionist methods for doing that. The other approach is to examine such problems as systems with many interconnected parts. In addition, context matters, value conflicts may be rife and not all unknowns can be dealt with. As researchers, we are much less well equipped for those kinds of investigations.

2. When looking at potential improvements in our environment, what gives you hope?

Environmental researchers are at the forefront of developing many concepts and methods for dealing with systems-based complexity, especially through modelling, including concepts such as path dependence, tipping points, and emergence. Another example is managing the inevitability of unknowns and so-called "deep uncertainty" with practices such as adaptive management and the precautionary principle.

3. Are there particular areas of frustration?

What most frustrates me is that these terrific concepts and methods are not easy to access, especially for researchers working in other areas such as public health or security. And there's some work in other areas that would be useful to environmental researchers, such as the growing understanding in public health about effective research implementation.

What motivates my research on *Integration and Implementation Sciences* is figuring out how to 1. get the research community to become as sophisticated at dealing with complexity as we are at reductionist approaches, and 2. make relevant concepts and methods readily available to anyone who wants them.

4. Is there a particular environmental policy reform you admire the most?

The *Global Footprint Network* springs to mind, although it's providing the basis for policy reform, rather than being a policy reform. The *Ecological Footprint Calculator*, as well as *Earth and Country Overshoot Days*, show how powerful tools for dealing with complexity can be.

5. Which trend in environmental policy and politics do you consider an aberration?

The trend that most worries me is the focus on "solutions", because it raises the expectation that there's a perfect or near-perfect answer for every problem. Instead, addressing complex problems always involves compromises and trade-offs. Given that most of us find such imperfection unsettling, not enough is being done to help citizens understand it or be able to realistically assess the compromises and trade-offs that government, business and others make, in order to be sure that they are not hiding incompetence or corruption.

6. What has your experience been when it comes to transferring scientific insights into practice?

Change is fascinating because it cannot be controlled. You can introduce your research results into what is effectively a change vortex, but you can't control what will happen or who will be influenced and how. Most of my experience has been in public health and I've had both heartening successes and dismal failures.

7. Besides the one you're working in, what field of research in the environmental sciences do you find most exciting?

I'm excited about some of the sophisticated modelling research and by research on deeper understanding of context, especially developing practical ways of taking into account the political, economic, social, cultural, historical and other circumstances affecting both a problem and a decision maker's space.

8. Can you name any person or event that has had particular influence on your commitment to environmental issues?

In 2001 I spent six months at Harvard University's Kennedy School of Government as a Fulbright New Century Scholar. I chose the Kennedy School because it was completely outside my comfort zone, but I figured it would help my thinking about tackling complex real-world problems, which was then becoming more central to my research. The main thing I learnt was not to be afraid to think big and be bold. That was partly because it is the American ethos, and partly through being exposed to world leaders in many fields.

9. What knowledge about the environment would you like to pass on to young people?

I'd like to pass on an understanding of complexity and its relationship to systems, context, values, unknowns and imperfection.

10. As a scientist concerned with sustainability, what contradictions do you face in everyday life?

As an Australian, a significant contradiction is air travel, which is essential for being part of the international research community. But there's great hope in technology. For example, last year I attended two workshops virtually, and although it meant working through several nights, it was less debilitating than jet lag.

11. What are you reading at the moment?

I've just finished, in short order, three books about the development of nuclear physics: *Lise Meitner: A Life in Physics*, written by Ruth Lewin Sime, *Planck: Driven by Vision, Broken by War* by Brandon R. Brown, and *Physics in a Mad World: Houtermans and Gelfand*, edited by Misha Shifman. Set in Germany and Russia, a common and sobering theme is the powerlessness of researchers against dark political forces and that survival in those circumstances is a matter of good judgement, difficult compromises, support of colleagues and luck.

12. Apart from the ones we've raised here, what is the most important question of our day?

An important issue that gets less attention than it deserves is that research capacity is limited and we will never have enough researchers to investigate all the critical problems in the world. This is exacerbated with increasing recognition of the need for research on community concerns and in non-weird (western, educated, industrialised, rich and democratic) countries. So the question is: how can society, the research community and individual researchers best prioritise and distribute research effort?

Gabriele Bammer,

professor of Integration and Implementation Sciences in the Research School of Population Health at the Australian National University (ANU), Canberra, Australia.

Born 1951 in Austria. BSc in biochemistry and BA in psychology and geography, Flinders University of South Australia. 1980 PhD in behavioural pharmacology at the University of Sydney. Employed in various departments at ANU since 1979. Visiting appointments at Harvard University's John F. Kennedy School of Government, the National Socio-Environmental Synthesis Center at the University of Maryland, and short-term at ETH Zurich and the University of Natural Resources and Life Sciences (BOKU) in Vienna.

Research focus: developing the new discipline of *Integration and Implementation Sciences* (i2S), unknowns, change; applications in population health, environment and policing and security.

Other activities: blog *Integration and Implementation Insights*, <http://i2insights.org>, which is building a community of researchers by sharing concepts and methods for dealing with complexity. Co-convenes (with Michael Smithson) an *edX Massive Open Online Course* (MOOC) on ignorance.

Selected publications: *Disciplining Interdisciplinarity: Integration and Implementation Sciences for Researching Complex Real-World Problems* (ANU Press, 2013) | *Change! Combining Analytic Approaches with Street Wisdom* (editor, ANU Press 2015) | *Research Integration Using Dialogue Methods* (ANU Press, 2009; with others) | *Uncertainty and Risk: Multidisciplinary Perspectives* (co-editor, Earthscan 2008).

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GABRIELE BAMMER ...

... has an incredibly ambitious research agenda. She is not content to merely add to our body of knowledge in one of the many systems thinking, transdisciplinary and intervention-orientated research communities. She is proposing something much larger: an alliance between researchers in all these currently-fragmented research communities to fundamentally change the landscape of applied research practice, its standing in academia and its role in the wider world.

Gabriele points out that knowledge about good practice is fragmented across all our research communities, with each one having its own preferred terminology and set of favoured references. This offers a tremendous opportunity for learning.

But stimulating learning is only part of her agenda. Gabriele is also concerned with the "political" consequences of this fragmentation: it allows the continuing dominance, in both the academic and policy worlds, of the traditional disciplines. While most of the long-established disciplines have professional societies with many thousands of members, and can therefore call on a critical mass of activists to work with governments, industries and other academic bodies to ensure their influence and sustainability, the intervention-orientated re-

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search communities are all too small for this. Thus, *Systems Thinking, Transdisciplinary Studies, Operational Research, Action Research, Cybernetics, Implementation Science* and many others are all in the same boat: they lack the necessary influence to consistently inform funding agendas, education policies and disciplinary assessment methodologies, so are at a perpetual risk of being marginalized.

To deal with these problems, Gabriele offers two solutions. First, a new discipline of *Integration and Implementation Sciences* (i2S), not to replace the many existing intervention-orientated disciplines and fields of practice, but to act as a conduit and structured repository for their knowledge to facilitate cross-community learning. Second, she calls for co-operation between all our intervention-orientated research communities to advance our common interest in moving from the margins to the mainstream. If you want to know more, see her i2S website: <http://i2s.anu.edu.au>.

If Gabriele were a traditional academic just writing papers and books, or a practitioner who only wants to make a difference through projects, then i2S and the prospect of a "political" alliance across our many research communities might be little more than a fanciful dream. However, she is not only a prolific writer and practitioner, but a consummate networker and social media activist, too! From her base in the Australian National University, she reaches out to the rest of the world and has a genuinely global reputation for research leadership. This makes achieving her ambitions, which are increasingly becoming collective goals, a realistic prospect. I am happy to recommend you get involved.

Gerald Midgley, professor of systems thinking, Centre for Systems Studies, University of Hull, United Kingdom.