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# Silent Revolution in Research for Sustainability

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Is research 'fit-for-purpose' for realizing sustainable development? More than two decades after the Brundtland report and UNCED Earth summit, the world has now adopted Sustainable Development Goals (SDGs). Rather than a cause for celebration, this delay should encourage reflection on the role of research in society. Why is it so difficult to realize sustainability in practice? The answer lies in the fact that universities and research centres persist with 19th century methods of data gathering, scholarly analysis, and journal articles. Today's world needs science in real-time, whether to detect drought, confront Ebola, or assist refugees. Research needs to work faster and embrace 21st century practices including data science, open access, and infographics.

A silent revolution is occurring in the ways of organizing and conducting research, enabled by new technology and encouraging work that tackles the key challenges facing society. A variety of new arrangements have come into existence that promote international collaboration, including Horizon 2020 with its emphasis on societal challenges, the Bill & Melinda Gates Foundation which has inspired a family of grand challenges funds on health and development, and the Future Earth joint program of research for global sustainability. These arrangements not only control billions of dollars in research funding, they also influence the strategies of national research councils and international organizations. The result is no less than a transformation in the incentives that reward how researchers invest their time and effort.

Why is a revolution needed? Within research, substantial growth in knowledge production coincided with fragmentation among disciplines. One can easily find expertise and publications in soil science or agronomy, yet integrated efforts on food security and climate adaptation remain scarce. Beyond research, society remains largely uninformed, as academics avoid engaging in public debate or policy advice. Research often fails to raise public awareness or inform practitioners regarding the issues facing society and the options for responding to them. For example, research on food security can and must go beyond quantifying how many people are hungry or undernourished. Society needs solutions that connect changes in farm-level production, to how the market mediates access to food, and the ultimate health outcomes among citizens.

The emerging vision is one where research helps society understand and respond to global problems. Research that is 'fit-for-purpose' demonstrates an ability to bridge ingenuity gaps, address grand challenges, and foster social resilience. Ingenuity gaps concern the knowledge needed to address rising complexity and new vulnerabilities introduced by globalization and technological change. Grand challenges describe a shift in the scale, scope, and ambition of research objectives. Social resilience refer to society's ability to cope with stress and reinvent itself in response to shocks and pressures. In short, Together these attributes describe an expectation that research helps society to 'mind the gap', 'think big', and 'bounce'.

Research needs to speak back to society. While the journal article and scholarly publications remain important determinants of a research career, they are increasingly supplemented by attention to data visualization, social media, and research impact. Research still needs rigour: deep knowledge of theory and data, and how to uncover patterns and establish explanation. Scientists have a long history of using pie charts, line graphs, and network diagrams to communicate among themselves. Yet research also needs a keen sense of design: an appreciation for how to convey relationships, categories, and magnitude through the creative use of lines, colours, symbols, position and size. Evidence-based illustrations, or infographics, convey complex issues in greater depth than long reports or TV commentaries. Research tells a story: starting with a compelling problem or question, and using data to provide perspective. Rather than offer society potential solutions or policy recommendations, newer techniques allow anyone to interact with data to create their own visualizations and test hypotheses “on demand”.

In summary, there is a silent revolution in research for sustainability. Research is expected to help understand and address the problems facing society. The opportunities to engage in research are shifting, rewarding those who are embrace the practices of open science and data, those who are connected to international scientific networks, and those that help society to better understand and solve global problems.

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**About Bruce Currie-Alder**

Regional Director, based in Cairo, with Canada's International Development Research Centre (IDRC) which invests in knowledge, innovation and solutions to improve the lives of people in the developing world. Trained as an environmental scientist, he is an expert in natural resource management and on the policies that govern public research priorities and funding. Before joining IDRC, he worked on water governance, coastal management, and the oil industry in Latin America. His recent works include “Research for the Developing World” and “International Development: ideas, experience and prospects” (Oxford University Press). Bruce holds a PhD in Public Policy (Innovation, Science & Environment) from Carleton University. He is also member of the executive board of International Water Resources Association (IWRA), a network of multidisciplinary experts on water resources.