Letter to the Editor: Response to *Global soil science research collaboration in the 21st century: Time to end helicopter research* by Minasny et al.

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Budiman Minasny and colleagues (Minasny et al., 2020) are to be congratulated for their incisive article about helicopter research in soil science, as are the editors of *Geoderma* for their new policy such that papers reporting research with primary data collection should include authors from the countries concerned. On the basis of our shared experience, as collaborating investigators working on soil science research in sub-Saharan Africa, we recognize the importance of this issue and its wider implications for sustainability of both research collaboration and development partnerships.

We are collaborators on the CEPHaS project, a project funded by the UK Government’s Global Challenges Research Fund, which addresses the development of capacity in soil physics, geophysics, hydrogeology and statistics to study conservation agriculture, a suite of interventions aimed at improving resilience of soils and crops under climate change. CEPHaS involves researchers from Zambia, Zimbabwe, Malawi and the United Kingdom – soil scientists, agronomists, agricultural economists, social scientists, geophysicists, hydrogeologists and statisticians. We have been collaborating on the project since October 2017, and many of us have been working together for longer than that. In this letter we share some aspects of our experience, practices and policies which we think go some way towards facilitating more equitable partnership in research. In summary, we think that the problem of helicopter research can be tackled only through the development of genuine partnerships, in which the global asymmetries of power and wealth between north and south are not allowed to distort the research agenda or to prevent equitable collaboration in which the interests, opportunities and contribution of all parties are respected. This requires a commitment to capacity strengthening and long-term engagement on the part of researchers, their institutions and the funders of research.

At the heart of the helicopter problem is the lack of a genuine partnership between institutions from the global north and the global south. It is heartening to see this receiving attention in soil science, and we would urge our colleagues in the discipline to examine how the matter has been addressed in other fields such as health research (e.g. Boum II et al., 2018) and to examine the practical guidelines and codes of practice which have been developed (see, for example, the resources provided by the Rethinking Research Collaborative, <https://rethinkingresearchcollaborative.com/>). However, the challenge of building equitable partnerships is not a trivial one because obstacles arise from inbuilt asymmetries of power, wealth and capacity. These must be overcome by ways of working together which are mutually respectful and equitable. This way we can tackle the priority concerns of communities, their farmers and extension workers in the countries where research is undertaken.

We were fortunate that when the funding programme which supports CEPHaS was first announced, most of the institutions in the project were already engaged in research together. Our first meeting to sketch out the project outline took place in Malawi where many of us were already meeting. From the start of the project the key research questions were formulated in shared discussion, and out of the experience of the scientists based in the countries where field work now takes place. No serious engagement with the agricultural and environmental problems of a country is possible without partnership with communities, institutions and individual scientists in those countries. Furthermore, a rapport and shared trust and respect between researchers from north and south, across levels of seniority, is essential for candid and honest discussion.

We have experienced cases where scientists, at institutions from the global north, chasing the latest funding initiative, pay scant attention to local expertise and interests. Scientists in the south are too often treated as data-collectors and field managers, and their lead role as investigators is not always recognized by funders or publishers. Increasingly there is a genuine aspiration on both sides to build mutually-respectful working relationships, but this is a long-term process which cannot be kick-started in the interval from a funder’s call for proposals to the deadline for submission. Those of us based in Africa have been regularly inundated with requests to join research consortia when such funding announcements come out. This is not a reliable way to build meaningful and equitable partnerships.  The approach which Giller (2020) describes, with funded workshops to develop proposals, is a good idea, but scoping or inception workshops are often superficial. They are often not, of themselves, an adequate substitute for a process to co-construct a research programme truly driven by demand on the ground. Ultimately research institutions and their senior management must be prepared to take responsibility for developing research strategies and partnerships to tackle global challenges over longer time scales than those of programme funding or government spending reviews.

It is also essential that research funders develop policies to facilitate effective research partnerships. This has to start with the formulation of funding calls. Who is the “primary client”? If the research agenda is formulated in the global north, and institutions from the south do not have a voice in identifying priority concerns, then northern institutions will chase the funding and their counterparts in the south, with a dearth of local funding sources, will have little choice but to comply. Research funders insist, rightly, on evidence that principles of equity are followed by the organizations they support, but they also have a responsibility to ensure that this is not undermined by programmes formulated without reference to the real needs of countries in the south and the perspectives and experience of scientists there.

The helicopter flies in and then flies out again, leaving nothing behind. We are convinced that a research project has not succeeded if it does not leave all partners, from north and south, better-enabled to engage in similar research in the future. But capacity strengthening is not an automatic consequence of research activity, it requires a conscious plan by all partners, to identify goals and to monitor progress toward their achievement.

The strengthening of research capacity happens at three levels: individuals, institutions and the broader research system, and all three must be considered. In the CEPHaS project we are undertaking substantial capacity strengthening at individual level with training in specific skills (statistics, soil physics in the field and laboratory, geophysics and hydrogeology), more generic training (project planning and management) and opportunities for professional networking for administrators and technicians as well as researchers. One critically important aspect of capacity strengthening at individual level is the promotion of opportunities for early career researchers to gain experience and develop professional networks. This applies in the global north and south, but is particularly important in countries where doctoral training opportunities may be sparse, and where early career scientists may struggle to develop a research profile. The initial activity in the CEPHaS project was a planning meeting where all the senior and junior researchers on the project formulated a shared “theory of change” and participated in detailed planning of research activities. For many early career researchers, from north and south, this was their first experience of research project planning, and was an opportunity to contribute from their experience to the formulation of the programme which they would later work on.

At institutional level we are developing and extending specific laboratory and field resources, used in collaborative research. However, capacity strengthening for institutions is not achieved just by leaving new mass spectrometers or tension plates in the lab. Institutional-level obstacles to effective research capacity are more complex, and have to be carefully identified and addressed. In the CEPHaS project we are collaborating with the Liverpool School of Tropical Medicine’s Centre for Capacity Research to support a bespoke programme of institutional-level research capacity. This programme is designed to complement other capacity strengthening facets of the CEPHaS programme and focuses primarily on strengthening research management and support (RMS) within the partner Universities. The process included completing an onsite assessment of existing RMS capacity against an international benchmark and then, drawing on the findings of the assessment, mutually agreeing priority areas that CEPHaS could provide support for over the course of the project. Importantly, this process also identified a range of capacity strengthening initiatives that each partner could take on independent of CEPHaS support. In this way, CEPHaS was able to tailor elements of its capacity strengthening programmes to meet priority RMS needs of each partner institute and facilitate a complementary, partner-led programme of RMS capacity strengthening.

Capacity strengthening at the level of the national or international research system is even more challenging. Key factors in the research environment for conservation agriculture in southern Africa are international organizations such as CGIAR centres, NGOs and Government research and extension services. We have researchers from the latter organizations directly hosted by universities on the CEPHaS project, and senior staff on the investigator team and project board. We also have NGO partners on the board and advisory committees, and two of our field sites entail collaboration with international centres or national research organizations. Through this engagement we attempt to embed project partners in the debate over conservation agriculture, and to contribute to the development of a clear set of research priorities developed in Africa and influenced not only by local perception of the challenge but a full awareness of the capacity of local institutions to address these.

If a project is to avoid the helicopter mentality, then this must be consciously addressed in clear policies, understood by all so that there is shared ownership of the research process, products and outcomes, including authorship of publications. In CEPHaS, for example, we have a data policy which makes clear that ownership of data lies with the institution in the country where they were collected. While partners agree to share those data, and all data are held securely on a central server to meet funder requirements, the data policy and the project publication policy ensure that the lead researcher at an institution will not find that data collected there have been published without full engagement and appropriate authorship. In the CEPHaS project the data policy has already been invoked on one occasion when a UK partner was asked to provide data by a third party who assumed it was theirs to pass on. CEPHaS partners in Africa have also had experience of researchers from northern institutions effectively ignoring local management structures, issuing work instructions directly to technicians or post-docs and bypassing local leadership. At the first CEPHaS board meeting this issue was anticipated, and a project organogram was developed to make clear to all that leads in African universities are responsible for the management of their staff, and that working group leadership teams, with a balance of northern and southern investigators, respect this when managing project activities.

The CEPHaS publication policy aims to ensure that local leadership in the development of the research programme, collection of data and analysis are fully recognized in authorship of papers. We want to overcome a situation, much exploited by predatory journals, in which northern investigators become *de facto* gatekeepers to the international literature, and to facilitate opportunities for all partners to share genuine lead- and senior-authorship roles.

Finally, an equitable partnership between institutions is not one in which the more powerful or resource-endowed partners maintain a long-term monopoly on their counterparts as collaborators. It will facilitate the development of new partnerships, such that institutions in the global south, for example, are enabled to collaborate with new partners whose skills and expertise may be better suited to new challenges and questions. The promotion and strengthening of partnerships and collaboration between institutions in the south is also critical. Ultimately this requires that both institutions and individuals put the common interest ahead of their own. This is difficult in a world where scientific success is measured by where your name appears in the list of authors on papers in high-impact journals. Ultimately the helicopters are fueled by the dominant scientific culture, and will not be grounded until sufficient voices demand that this changes.

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