Brief for GSDR 2015

Enhancing the quality of African climate change science by investing in peer review capacity

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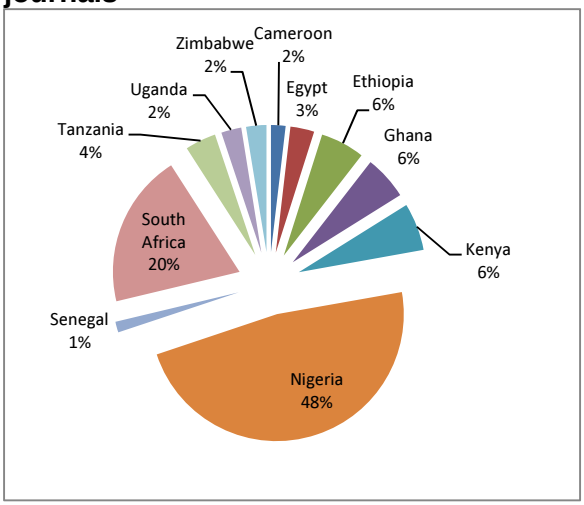
State of African Climate Change Science

Globally, climate change will bring "harder rains in a hotter climate" (Berg, et al., 2013). For African farmers, it will bring more erratic rainfall, more frequent and severe droughts in dry lands and savanna areas, and shifts in weather patterns that will alter the timing and length of cropping seasons (Niang, et al., 2014). Building resilience, enhancing climate change preparedness, and mainstreaming climate sensitivity need to become integral components of all agricultural and sustainable development planning in Africa (Hassan, 2010). Science must play a greater role in guarding against expected food shortages in Africa; many calls to that effect have been made in international discussions, including those hosted by United Nations bodies (Pearson, 2004; Poliakoff, 2011). Put simply, African scientists need to act quickly to re-do much of the existing, as well as new science about crops and livestock, the environment, and livelihoods for changed climate scenarios. Science based solutions are only considered credible by intended users if these are properly peer reviewed for the scientific merit.

So far, most of the peer reviewed climate change science about and for Africa has been undertaken by research programs funded and led by affluent countries; the resulting papers have generally been published in acclaimed journals located in developed countries. Thousands of journals address climate-related issues relevant to Africa, developed countries. Thousands of journals address climate-related issues relevant to Africa, but far too few such publications are actually located in the countries being discussed. Even African scientists tend to publish their peer reviewed science in the journals located in or managed by developed countries. Of the 450 online African journals, more than two-thirds originate from two countries: Nigeria and South Africa (Figure 1). Only nine other countries in the continent publish more than five open-access journals. This typifies the ecosystem of climate-related peer reviewed scientific expertise within Africa.

Figure 1: Geographic origin of online African journals



Source: Author's drawing based on information available at http://www.ajol.info (only African countries with more than 5 online journals at the website are included)

Many African countries get a significant share of their budgets for climate-related research and development from overseas, mainly from philanthropists, non-governmental organizations, aid agencies and traditional science funders. There is a need for such external funding, but some might argue that it prevents African nations from choosing their own research priorities

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(Poliakoff, 2011). The resultant South-to-North and East-to-West flow of scholarly information has made it nearly impossible for many African academics to access each other's work (Teferra and Altbach, 2004). Such tendencies have also created perceptions amongst African policy-making institutions that Western and Northern climate change science remains divorced from and irrelevant to, African realities and issues. The science may be credible, but it lacks salience and legitimacy, which are keys to its utilization by policy makers (Clark, et al., 2011).

Is Adequate Science Capacity Available in Africa?

Capacity in science has two key dimensions: the competency to undertake credible, salient and legitimate research, and the skill to review and assess research for its scientific merit and authenticity. Many donor initiatives[1] are addressing the capacity to undertake research in Africa. Most of this capacity development, however, aims at "individual capacity": funding masters, doctoral, and postdoctoral research projects through fellowships. Developing individual capacity without support for the development of organizational and institutional capacities creates vulnerabilities, as it could encourage further brain drain from capacity-poor African countries to capacity-rich affluent countries (Ndulu, 2004). High quality peer-reviewed climate change science, being in its infancy in Africa, remains particularly vulnerable to such brain drain.

Another critical weakness of the current science funding programs for Africa is the lack of attention to the capacity for ensuring science quality through credible peer review. Peer reviews help increase credibility, salience and legitimacy. Yet students and scientists receive little, if any, formal training in peer review. The situation is particularly acute in Africa, where the numbers of researchers and scientific journals are increasing. African capacity in peer review resembles a typical developing country age pyramid, with many inexperienced researchers at the bottom and a few experienced scientists capable of reviewing at the top.

In a recent article published in *Science*, John Bohannon (2013) demonstrates how flawed the editorial and peer reviewing practices of open access journals remain even in many countries that rank high in their capacity to undertake and publish research. He blames the poor quality on the revenue focus of online journals; however, one might argue that the dramatic increase in the number of scientific journals has exhausted the available peer review capacity, and thus the newly emerging online journals have had to rely on second- and third-best peer reviewers. If Bohannon's sample had included subscription journals, the situation with respect to peer review, especially in Africa, might not have differed much. This is because universities simply do not teach their students how to do effective peer reviews.

Could Capacity Development Interventions Help Improve Peer Review?

While there is considerable scientific interest in understanding the flaws of the peer review system (see for example, De Vries, et al., 2009), there is little guidance on how best to conduct peer reviews. There is no single textbook aimed at guiding the novice on how to perform peer review, although some guidelines on how to deal with reviews does exist. A systematic review of peer review (Jefferson, et al., 2002) concluded that "the [current] practice of peer review is based on faith in its effects, rather than on facts". Sense About Science (2009) found that 56% of the surveyed peer reviewers felt that there was a general lack of guidance on peer review, and 68% thought that formal training would help improve their reviewing skills. However, short training in peer review was found to have little impact on improving the quality of peer review (ibid), which is not surprising, given the various competencies required to distinguish excellent from mediocre

[1] A few examples of climate related food and environmental sciences include: a) Those of the 15 CGIAR centers, who partner with universities and research centers in African countries to train young scientists through degree and non-degree programs, b) The African Academy of Sciences' 5-year long scientific capacity development program on climate change, c) The German Ministry of Education funded 2 centers of excellence for Climate Change research in west and southern Africa, where hundreds of master and doctoral students will be trained

science. Together, this indicates that there is a need to improve the capacity and practice of peer review, and the best way to do so would be through formal tertiary-level teaching rather than quick fixes of short trainings.

A group of scientists at the World Agroforestry Center[2] recently discussed the issue of how to address this lacuna in high quality peer review in African climate sciences. The group concluded that capacity development in peer review deserves as much attention as knowledge and skills training for conducting and reporting research. One approach would be to design, test and adapt curricula that aim to develop competency in peer review for the staff and students of tertiary education institutions. Once successfully tested and adapted, these courses could then be institutionalized in higher education curricula in the developing world, including Africa, through tertiary education networks. Ideally, education in peer review should become mandatory for doctoral and optional for master students.

A complementary approach facilitating institutionalization would be to develop a global accreditation system that registers researchers who are skilled in peer review. Such a system could include facilities to (self) assess aspirants' reviewing capacities, advise on and make available training, and offer a certification test. National or supranational science organizations, such as the International Science Foundation, or national or regional academies of science are best placed to develop and house such an accreditation system. If accreditation were obligatory for those seeking a career in science, then it might be possible to run the system commercially.

Accreditation in peer review has many advantages. Researchers would benefit from developing their capacity and gaining recognition of their competency, with possible spin-offs for greater personal research efficiency. Employers in research would benefit from the assessment of a core competency among their staff and could consider using it in selection procedures and performance evaluations. Scientific journals would benefit from better peer review through certified peer reviewers; indeed, having a higher proportion of certified reviewers could also enhance a journal's reputation.

However, the greatest beneficiaries would be our societies, particularly in Africa, which would benefit from the power of peer review to undertake better analysis and develop better solutions to address climate change and related challenges. As the need for peer review capacity is particularly acute in Africa, we call upon the African Academy of Sciences and its funders to consider developing educational programs to enhance peer review capacity as well as an accreditation system for scientific peer review.

[2] Legal name is International Center for Research in Agroforestry (ICRAF).

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