

Towards more equal footing in north–south biodiversity research: European and sub-Saharan viewpoints

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Abstract Research collaboration between developed countries from the northern hemisphere and developing countries in the southern hemisphere is essential for the understanding and protection of the major proportion of biodiversity located in the tropics. Focusing on the case of sub-Saharan Africa, we here assess the real involvement of northern versus southern contributors, and caution against unequal academic benefit sharing arising from non-commercial biodiversity research that may ultimately hamper sustainable knowledge transfer and long-term biodiversity conservation. We discuss possible drivers that may have led to a business of raw biodiversity data. While we fully support the current efforts to stamp out biopiracy through international biodiversity policies and agreements, we illustrate that such legislative frameworks may further constrain biodiversity research, especially in countries where regulations are poorly streamlined and

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bureaucracy remains rather inert. We therefore ask for workable solutions towards more equal footing in north–south biodiversity research, and propose a number of steps to transgress the current barriers towards a more fair and equitable sharing of benefits arising from biodiversity research.

Keywords Benefit sharing · Biodiversity access · Biopiracy · Colonialism · Knowledge transfer

Distribution of biodiversity, access and equal benefit sharing

Biodiversity is unevenly distributed across the globe, with the vast majority of biodiversity scattered across tropical regions (Myers et al. 2000; Zachos and Habel 2011). Such areas are of great relevance for understanding evolutionary diversification, ecosystem functioning, and for studying conservation issues (Plumptre et al. 2003). Apart from exceptional biodiversity, many of these regions are also characterized by high demographic growth rates, unstable politics, and armed conflicts (Cincotta et al. 2000; Hanson et al. 2009). Rapid environmental transformations, coupled with the effects of climate change, have not only caused an unprecedented biodiversity crisis, but also profoundly affected local economies and societies (Guo et al. 2010). Thus, fruitful collaborations between researchers and conservation biologists from northern hemisphere and southern countries are crucial to elaborate evidence based conservation strategies.

Biopiracy remains a big issue where foreign prospecting of tropical biodiversity for commercially valuable genetic or biochemical resources often results in proceeds not being fairly shared with the source country (Hamilton 2006). At the same time, restrictions have increasingly inhibited drug discovery programmes, with many pharmaceutical companies opting out of natural product work as a consequence of increasing biodiversity and plant health regulation (Hawksworth and Dentinger 2013). Protection, access, and equal benefit sharing are therefore at the centre stage of international biodiversity policies and agreements, consolidated in the Convention of Biological Diversity (CBD) and in newly emerging national policies (Schuklenk and Kleinsmidt 2006), either explicitly (e.g.

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Sect. 100 of Namibian Constitution) or implicitly (e.g. Sect. 24 of South African Constitution; Sect. 42 of Kenyan Constitution). While such regulations are fully justified to ensure fair and equitable sharing of benefits arising from biodiversity in all its aspects, they are often hampered by weakly streamlined and inert bureaucratic procedures that may be subject to unpredictable, short-term modifications (Mahanty and Russell 2002). Moreover, the intrinsically vague definitions used in the CBD, especially with regard to the term ‘genetic resources’ (Schei and Tvedt 2010), and national legislation regarding access, genetic and biological resources, and intangible components are often so loose that it is hard to imagine what kind of research activity does not qualify as biodiversity prospecting. These hurdles for non-commercial biodiversity research are unfortunate as the scientific community increasingly recognizes the unique value of biodiversity as natural laboratories for eco-evolutionary research (Plumptre et al. 2003).

Data collection versus data analysis and reporting

While biological research has been deeply rooted in many countries of the northern hemisphere, countries like Brazil, China, Colombia, India, Indonesia, Malaysia, Mexico, the Philippines, Singapore, and South Africa are now emerging as major players in this field. When revising publications on “biodiversity” archived in the Web of KnowledgeSM since 1990 (N = 55,888), the proportion of articles co-authored by researchers from one of these countries increased more than threefold over the past 23 years (1990–95: 6 %; 1996–2000: 9 %; 2001–05: 11 %; 2006–10: 17 %; 2011–13: 20 %). This optimistic trend signaling an increase in biodiversity research in these countries becomes blurred when having a detailed look on leading (first), senior (last), and corresponding authorship on articles published in Journals dealing explicitly with biodiversity in the tropics, like *Biotropica*. Here, most of lead, senior and corresponding authors are hosted in developed countries (84 %, based on all issues published since the year 2000). This outcome reflects that research activities by sub-Saharan African partners are still predominantly restricted to raw data collection or, at best, preliminary data analysis. In contrast, conceptualisation of study designs, sophisticated laboratory tests, most statistical data analysis, data-interpretation and the dissemination of results in peer-reviewed journals are still primarily carried out in institutions located in the northern hemisphere (Harrison 2006; Boshoff 2009).

Under such a setting, the benefits for countries from the southern hemisphere are often restricted to monetary profits. Non-resident fees for research and export permits can be considerably high, and local institutes often ask for further financial input when acting as affiliating body. In addition, though they are often granted reduced rates, researchers may still have to pay daily park entrance fees (e.g. so-called ‘conservation fees’ in the Republic of Kenya) when conducting their research in a national park, in addition to allowances for supporting staff, logistic costs for local partners/students, nightly accommodation fees, and—in case they want to export their samples to their home institutions—‘access permits’ fees. Knowing that researchers mostly operate as a team, budgets can easily rise up to several thousands of \$ for a single field trip.

Possible causes for biodiversity data trade

As illustrated above, biodiversity research stakeholders in the western developed and sub-Saharan countries often appear to tacitly support a business trade of raw biodiversity data

rather than true scientific collaboration, not only in terms of intellectual properties but also in terms of concrete conservation actions (Cracraft 1995; Cock and Fig 2000). Promotion and tenure decisions in the north are chiefly based on journal citation metrics and successful fundraising, with funding agencies expecting rapid publication return once projects are completed. While academic benefit sharing does not jeopardize high-impact academic output per se, the nominal weights ascribed to training and capacity building in research evaluations generally do not motivate, or even allow, northern researchers to substantially invest in this. Even for scientists working in biodiversity and conservation, long-term benefits in the regions where research is carried out are irrelevant when it comes to academic evaluations and the allocation of scientific positions. This is further exacerbated by “brain drain”, where highly-qualified Southern scientists frequently shift to northern institutions, thereby depleting the human resource base that would engage northern scientists to undertake research in the South.

Moreover, there appears to be some discrepancy between the agencies’ grant requirements (i.e. insisting on high policy relevance and stakeholder engagement), and the restrictions these same agencies put on budget use. As a consequence, scientists often need to rely on additional grants and secondary resources (e.g. unspent money at the end of a project or an accounting period), which is obviously not sustainable in the long-term. Moreover, project duration is often too limited to ensure long-term sustainable development.

Towards more equal footing

Despite these conflicts of interest—the western developed countries have funding restrictions, focussing on academic research, tenures, and careers, while countries from sub-Saharan Africa have a restricted infrastructure, complex procedures, financial constraints, and brain-drain, there exist solutions that can help a move towards a more equal footing in non-commercial biodiversity research. Firstly, institutions and funding bodies in the western developed countries need to ascribe greater weights to local engagement and capacity building in granting, promotion and tenure. Indeed, funding agencies interested in implementing the Convention on Biological Diversity (CBD) should be ready to provide technical assistance and guidance and ensure that evaluations transcend the sole aspiration of yielding high-ranking papers. This would provide a strong basis and the capacity for implementing the National Biodiversity Strategies required by the CBD, while at the same time it would result in an authority to claim for the benefits.

Secondly, equal footing greatly relies on local stakeholder engagement throughout the research development process, from inception and co-design of the project to the actual implementation, publication and translation into societal and economic benefits. Various protocols can be used to formalise and actualise this type of engagement, including Mutual Transfer Agreements (MTAs), Memoranda of Understanding (MoUs), and/or Free, Prior and Informed Consents (FPICs). These may contain mutual expectations, rights, procedures and obligations, including logistic support by local authorities and research institutions, technology transfer and capacity building, use and depositing of scientific collections, and joint publications and credits. While such protocols are well-established in several sub-Sahara African countries, proper implementation has often failed both in terms of the application process and its outcome (Szablowski 2010). Reasons for this failure are varied, and mainly revolve around the timing and level/type of engagement. To a large extent, this can be attributed to the currently dominant top-down engagement, where the

researchers from the western developed countries arrive at the negotiating table armed with pre-determined project goals and funds leaving little latitude for a real exchange of ideas and a sensitivity to the local needs and priorities. This situation needs to be tempered with a bottom-up engagement (probably also including financial input) to allow stakeholders in sub-Saharan Africa to provide input for any research agenda at an early planning stage. Bottom-up commitments could further benefit from the establishment of research council organizations identifying commonalities. Such councils could also endorse research projects from sub-Saharan African countries and present it to suitable funding entities in the western developed region. Doing so would avoid project overlap and possibly spark more involvement of politicians who often overlook biodiversity issues. Also, more southern countries could support national centres that co-ordinate the local monitoring of long-term ecosystem changes, maintain records, and facilitate local research initiatives.

Finally, to avert “brain-drain”, institutions funding scholarships for sub-Saharan African students to attend northern universities might also consider investment in biodiversity employment for post-graduates in the local countries. This has been successfully pioneered by Ethiopia (implemented by Jimma University), and elsewhere. There is also scope for increasing the skills levels of permanently employed staff in less developed countries through agencies funding extended (e.g. 12 months) placements in centres of excellence, as was done through the Darwin Fellowships scheme funded by the UK for 22 post-doctoral specialists to work in the entomology, mycology, and parasitology institutes of CAB International in the 1990s. The combination of transparent and mutually acceptable policies for non-commercial biodiversity research plus retention of a critical mass of well-trained researchers in the south will create opportunities for long-term collaborations and partnerships that are most likely to directly inform biodiversity conservation in areas where it is most urgent.

Outlook

Overcoming the current barriers towards a more fair and equitable sharing of academic benefits arising from biodiversity (research) may seem intrinsically complex, yet it is feasible with only minimal change in the way research agendas are set and responsibilities assigned. Conducting research in developing countries is development cooperation and aligns with growing knowledge and involvement of stakeholders of all kinds. Biodiversity-rich countries will not be able to control and defend what is unknown to them. Without knowledge and trained professionals, biodiversity is devalued, with concomitant negative effects for conservation and local economies and poverty alleviation (Secretariat of the Convention on Biological Diversity 2010; Roe et al. 2013). Strengthening capacities for the effective use of biodiversity science in decision-making at all levels is a key priority, as also exemplified by the recent establishment of the Intergovernmental Platform for Bio-diversity and Ecosystem Services in Panama (Turnhout et al. 2012). The identification of mutual benefits and win-win-situations as a basis for fair partnership can certainly lead to sustainable knowledge transfer over decades, and to improved conservation of the planet’s biodiversity, its ecosystems and the services they provide to humankind.

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