

Tropical biologists, local people and conservation: new opportunities for collaboration

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Tropical biologists need help. Examples show that local people can be trained to be effective parataxonomists, greatly assisting efforts to document and assess tropical biodiversity. Local collaborations also offer promising ways with which to improve natural resource management and conservation. However, for several reasons, most biologists remain slow to approve and implement these approaches. The challenges and potentials need evaluation and neglect means that opportunities are being missed. Here, we consider experiences of local collaborations and discuss obstacles to their wider implementation. We urge tropical biologists to recognize and embrace the opportunities provided by working with local people.

The observation that many species are becoming extinct before they can be investigated, led Pfeiffer and Uril to argue recently that tropical biologists need help [1]. They propose building research collaborations with local communities, which, they suggest, will enable research to be scaled up cost effectively, while also engaging communities in conservation-oriented interests. Would such collaborations work? Evidence suggests that they could [2–4].

There is an increasing appreciation of local perspectives and contributions in ecology and conservation [5–9]. Accounts of indigenous land-types [10] and insights in plant ecology [11] illustrate the potential of local consultation to enrich our technical knowledge. However, these developments are frequently out-of-sight to mainstream biologists [12]; for example, ethnobiology, although engaging in sophisticated practical ecology (e.g. [13]) remains a subdiscipline of anthropology rather than of biology. Here, we argue why one aspect of these developments (formalized local collaborations) requires more attention from conservation-minded tropical biologists.

Local people have already helped biologists to address goals ranging from taxonomic collection and developing estimates of local or even global species numbers [14,15], through to more applied concerns, such as raising conservation awareness among local communities [16] developing national biodiversity policies [17], refining timber-harvesting approaches [18], monitoring environmental

impacts [19], and planning, implementing and evaluating conservation interventions [7,20,21]. These activities vary in the type of collaboration required. Here, following on from the call by Pfeiffer and Uril [1], we consider experiences with local collaborations for species inventories and related ecological studies, and the wider range of opportunities that local collaborations can offer for conservation.

Parabiologists

Biologists working in the tropics have always relied on local people for guidance and assistance. However, the idea of scaling up biodiversity surveys by using local people in a more formal role is little more than a decade old [22]. Motivated by opportunities for employment, training and status, as well as by curiosity and interest [2,4], these local parataxonomists (people who lack formal higher-level education, but who are trained to undertake taxonomic tasks) and/or parabiologists (people who lack formal higher-level education, but who are trained to undertake biological research tasks) can provide better information about local biodiversity at a greater rate and a lower cost than is feasible using university-trained expertise and conventional approaches [2].

Parabiologist-based approaches have achieved impressive results. The forests of Kinabalu, Sabah, Malaysia have been extensively explored by professional botanists for over a century, yet a recent project led by the People and Plants Initiative (<http://peopleandplants.com>; [14]) engaged community-based collectors and increased the known palm genera from ten to 19, and overall palm taxa by 48 to 81 over only four years. The parataxonomists of the Biodiversity Inventory Program of the National Biodiversity Institute (INBio) (http://www.inbio.ac.cr/en/inbio/inb_queinbio.htm) in Costa Rica have collected >3 000 000 insect specimens in 13 years. Parataxonomists in the Area de Conservación Guanacaste in north-western Costa Rica have posted >200 000 caterpillar rearing records for >3000 species on the internet in the past two decades (<http://janzen.sas.upenn.edu>). Novotny *et al.*'s study of host specificity of 1010 leaf-chewing insect species on 59 species of woody plants in Papua New Guinea [15] was completed in only three years with the help of seven parataxonomists [3,23].

Local collaborations can also improve data quality: for example, collecting comprehensive fertile plant collections

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is only possible for those who, like local residents, can await the flowering and fruiting of each species [1]; local observers are also best placed to raise juvenile insects for identification [2,4]. Local people are also good searchers, often acutely aware of the local distribution of sites and resources [14] (Figure 1).

Conservation opportunities

More effective surveys can improve conservation priority setting or monitoring, but collaboration might also provide additional benefits. Increased communication between biologists and local people can inform and clarify the views of each group regarding conservation [1]. There is potential for advocacy: Novotny *et al.* [2] declare that the parataxonomists with whom they worked 'are far more effective communicators of the value of biological diversity

to village landowners, compared to expatriate scientists performing the same work'. Locally trained parabiologists eventually move on to seek employment elsewhere, possibly carrying a more conservation-oriented viewpoint [4]. Such indirect benefits, although potentially valuable, have received little investigation.

Collaborative approaches can also help biologists shift their emphasis from theory towards reality. Researchers who are more informed about local circumstances are better able to identify viable win-win opportunities and advocate for them [19,24]; for example, foresters in the Philippines often assume that upland farmers are destroyers of the forest, whereas research showed that they were cultivating up to 135 species of tree, and were propagating rare native species (A. Lawrence PhD thesis, University of Reading, UK, 1999). Trained parabiologists are only one tactic: any approach that considers and reflects the views of the local people can help by making conservation and research results more relevant to people's needs and, hence, to the decision makers concerned with meeting those needs. In an increasingly democratic world, such opportunities are increasing.

Experiences suggest that local involvement in the decision-making process can lead to improved conservation; for example, involving local people in patrolling and making management decisions has proved effective in helping to keep protected areas protected in the Philippines [20]. In Laos, a failing forest management project was turned around by the inclusion of local villagers and their needs in the management process, leading, among other benefits, to the protection of sacred wildlife-rich areas [25]. Supporting local people as both the researchers and decision makers is beyond the experience of most biologists, but can yield tangible conservation results. In Brazil, scientists have facilitated local people to monitor the populations and phenology of prized fruit-tree species in the forests. The results of this monitoring exposed the long-term value of fruit harvesting in comparison to timber harvesting contracts and led communities to reject logging in favour of forest protection [26].

Obstacles to working with local people

Given the overwhelming need for improved tropical conservation, and the promise of local collaborations, why do we not see wider adoption and implementation of these approaches? Some challenges are practical: projects must be tailored to local contexts, cultures and demands, and they often require time and flexibility, which can be difficult in a world of short-term, tightly planned grants [4,26].

Other challenges concern day-to-day management, such as learning to handle local expectations, developing appropriate incentives and holding on to trained staff. There are also concerns over intellectual property; for example, who owns research results and how any credit and/or commercial benefits are handled [27,28]. All these issues require sensitivity as the different circumstances of local people and outsider researchers can easily provoke charges of inequity and exploitation. Even the most successful collaborative projects have critics. Such challenges are not intractable: a recent survey of the 17 parataxonomists working with INBio revealed that,



Figure 1. People who have lived their lives in a location usually know much more about what occurs where than any visiting biologists. (a) Illustrated guides (and sound recordings) enable researchers to draft provisional species lists based on local recognition. Here, one local informant, Pak Parman, uses a book to show a child the bird species that occur in the nearby forests, and explains, as learnt from the researchers, that many of these species are not found anywhere else (Papasena Village, West Papua, working with Conservation International; <http://www.conservation.org/>). (b) Pak Aran Ngou, a Merap farmer, explains to CIFOR researcher Imam Basuki how soil properties vary in a region of tropical forest in East Kalimantan. Photographs reproduced with permission from Douglas Sheil.

whereas 11 thought that they should be paid more, and five wanted more time at home, all showed continued enthusiasm and motivation for their work (Jana Rauch, pers. commun.).

There are numerous other practical questions: who to work with, how to deal with local languages, the reliability of information, what to believe, and how to avoid cultural obstacles and misunderstandings. Considerable guidance can be found in the social science literature (e.g. [22,29–33]), but biologists might not know, have access to, or feel comfortable with, the literature of such disciplines [34].

Data quality is a concern in collaborative projects (e.g. [35–37]). Researchers working with parataxonomists address data quality through training and supervision, and by engendering pride in quality of output [4]. Computer and software advances have eased specimen referencing, comparisons, descriptions and data management, and have made these tasks more attainable with limited training and supervision [2,16]. However, when data reflect people's inherent knowledge and judgements, information quality cannot be controlled in this manner. Nonetheless, good practice dictates that any information should be adequately replicated, and cross-validated whenever possible (e.g. [35,37]), and that adequate effort is invested in clarifying the character and variation of all contributions (e.g. [38]). From our perspective, the need for crosschecks and quality control is true for all data collection, and is often overemphasized in discussions of local collaborations.

Prejudices against local inputs are seldom spelt out (e.g. [10]), but that does not make them less real, and influential sceptics have proved a deterrent for those seeking funds [22]. Some feel that objective scientists should avoid sources of subjectivity, such as people. Others insist on seeing local people as a problem for conservation, rather than as potential conservationists. Conservation projects often employ the rhetoric of local participation, but give little role to local input: project objectives usually attempt to gain local acceptance of preconceived conservation goals rather than asking what goals might be most locally acceptable, or even desirable. Related to this is an emerging scepticism in social and political science regarding the wide-spread use of the word 'participation' [39], which might nurture doubts in those with interest in the basic idea, or even encourage them to avoid the topic altogether. One additional impediment to any collaborative research activity is that people, including biologists, do not like delegating control and status [4].

Despite the fact that conservation problems are seldom purely biological, cross-disciplinary approaches are still avoided by many researchers. One reason might be that researchers departing from the comfort and customs of the disciplinary mainstream forgo the publications that carry weight with their immediate peers and employers. When academic survival is based on performance, conservatism is a safer option. It is probably no coincidence that the most visible collaborative initiatives focus on recruiting local people to follow a respectable textbook model in which they become parataxonomists supervised by 'real' taxonomists.

Conservation is ultimately not a science but a societal goal – a normative and ethically motivated pursuit – that

must include voices other than those of scientists alone. Researchers working in tropical conservation increasingly find themselves under a broad barrage of demands and criticisms regarding their role and responsibilities [6,9,40–44]. Collaborative approaches offer a positive response to this.

There are attitudes to consider, and tradeoffs to be made. Research norms (technical, objective and replicable) can conflict with conservation needs (such as understanding local motivations). Cultural values and contexts define and motivate conservation agendas throughout the world, including those in developed countries [45,46]. Such key elements might easily be neglected or excluded by researchers who do not explicitly look for them in other cultures. This can limit the opportunities for insight and consensus regarding conservation, as local people might not relate to technically framed enquiries or explanations. Learning how to communicate and work together effectively is the fundamental challenge of all collaborations.

Conservation researchers need not completely abandon their worldview, but should leave space for others. Local people who are encouraged to reach their own conclusions are more likely to accept them. For example, one of us (A.L.) made repeated visits to Nepali community forests with local users (who lack scientific training). The aim was to help determine what was important in the forest so that these users could develop their own forest monitoring. The users were struck by the fact that, each time they visited the forest for informal participatory evaluations, they revised their total numbers of valued species upwards. 'Maintaining species richness' was subsequently included in their list of forest management goals (A. Lawrence, unpublished).

Conclusions

The benefits of systematic approaches to the involvement of local people in biodiversity surveys and in applied conservation appear undisputable. But researchers seem wary of embracing these benefits. We see these missed opportunities as systematic of a wider set of practical challenges and disciplinary obstacles, but we also believe that these challenges and obstacles can be overcome. We encourage explicit discussions and assessment of the quality, validity and ethics of collaborative approaches.

Examples of effective local participation in conservation-oriented research projects are still mainly small and localized; scaling up such activities to deal with national and regional biodiversity management concerns remains a challenge. However, wider trends and increasing political support for decentralization, community forestry and community-based conservation might provide a fertile environment for larger scale action [47–49]. Indeed, such programs, although generally effective in developing larger-scale participation, are often weaker on technical content and could themselves benefit from the input and guidance that concerned, open-minded biologists can bring. Well implemented participatory methods can help bridge the gap between different stakeholder groups by encouraging consultations and informed negotiations that include explicit acknowledgement of both local wishes and scientific understandings.

Democracy is spreading across the globe and we are involved in one of the most decisive experiments of all time: will democracy help save tropical biodiversity? Involving communities is one way to do more biology in the tropics, but it is also an ethically defensible way to set about developing effective conservation. The potential contribution of local people to biological sciences and conservation – whether as guides, assistants, analysts, participants, experts or controllers – should be evaluated carefully and without prejudice. The idea that local people can be organized effectively to help researchers scale up their technical data collections is well established. The additional assertion – that local people can be formally engaged to guide and support more effective conservation – shows promise and deserves further evaluation. We encourage tropical biologists to add local collaborations to their toolbox of approaches.

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