Guest editorial

The unglamorous essential foundation of conservation science

There has been a growing interest among biodiversity conservation practitioners and organizations in concepts such as monitoring, adaptive management, evidence-based conservation, and learning networks (see for example Bill Sutherland's Editorial in the January 2005 issue of *Oryx*). At their core, all of these efforts involve promoting more systematic information sharing and learning between conservation practitioners in and across different organizations. Ultimately, these efforts are about trying to develop a body of knowledge and practice about how to make conservation more effective - to create a full-fledged science of conservation.

An unglamorous yet essential foundation of any science is a standard taxonomy. If we want to create general principles for conservation work we need to have a common language to talk about the problems we are dealing with. Imagine an online database of conservation experiences. If one team records they are facing the threat of 'cattle', another 'livestock' and a third 'grazing', then they have no way of knowing they are all grappling with the same problem and thus can't take joint action or learn from one another. But if they agree on a common term - or at least link their specific terms - then they at least have a chance to have a productive dialogue.

At the most basic level a standard taxonomy provides this common language. Reflection on the history of science reveals, however, that it can do more. Linnaeus's classification system created a common nomenclature for biology. But the hierarchical nature and the relation of different taxa also provided a platform for the subsequent development of biology's fundamental paradigm – evolutionary theory. A good taxonomy thus not only names things but provides a framework for the core research and inquiry of a nascent scientific discipline.

Over the past few years we have been working with the Conservation Measures Partnership (see http://www.conservationmeasures.org for an overview) to develop basic taxonomies for biodiversity conservation. At its core the work of conservation ultimately involves project teams taking action to achieve certain desired outcomes among factors (direct threats, indirect threats, and opportunities) that affect biodiversity targets (Salafsky *et al.*, 2002). This model applies to conservation work at all scales ranging from management of a small pond to an entire ocean. There has been a great deal of work over the past few years in creating standard ways of describing biodiversity targets, including both species and ecological communities and systems (e.g. Jose *et al.*, 2003; IUCN, 2005). There has been far less work, however, on developing taxonomies for the other factors in the above model, including in particular the direct threats facing biodiversity, and potential conservation actions. The existing efforts (e.g. Salafsky *et al*,. 2002; IUCN, 2005) have some substantial limitations with respect to our criteria for a good taxonomy:

- *Simple* Clear language, understandable to all practitioners
- *Hierarchical* Creates a logical way of grouping items that are related to one another
- *Comprehensive* Covers all possible items (at least at higher levels of the hierarchies)
- *Consistent* All entries at a given level of the taxonomy are of the same type
- *Expandable* Designed so as to enable new items to be added as they are discovered
- *Exclusive* Any given item can only be placed in one cell within the hierarchy
- *Scalable* The same names can be used for items at one site and across a continent

To this end, over the past few years, we have developed taxonomies of direct threats and conservation actions that we feel go a long way towards meeting the above criteria. We are pleased to announce the formal release of the first public versions of the *Taxonomy of Direct Threats* and the *Taxonomy of Conservation Actions* (CMP, 2005). These taxonomies, as well as a mechanism for providing comments and feedback on these initial drafts, are available at http://www.conservationmeasures.org

Development of these taxonomies was done both inductively (thinking theoretically about potential categories of threats and actions) and deductively (getting lists of threats and actions from projects and attempting to fit them into our draft taxonomies). We also consulted many experts about our draft versions. There are many possible ways to cluster and group direct threats and conservation actions; we chose an approach based on the anticipated applied use of these taxonomies in both guiding effective conservation work and developing the science of conservation.

Some of the higher level categories were straightforward to develop. For example, the different categories of pollution in *Class 6: Pollution* of the direct threats

taxonomy. Other classifications, however, required some interesting decisions. Take our category *4a: Hunting, Trapping, & Fishing*. It may seem strange to put subsistence honey hunting, big game trophy hunting, and commercial fishing in the same category of direct threats. But we found that all of the threats in this category cause similar problems and, more importantly, have potentially similar solutions. As a result the lessons that one project team learns about managing open access honey resources in a forest may have direct bearing on another team's work on managing a commercial fishery. Having these two threats in one category increases the likelihood that these two teams will find and interact with one another and be able to arbitrage each other's work.

Likewise, in early drafts of the direct threats taxonomy, Class 7 was titled *Invasive Species* and was subdivided into categories of exotic and native plants, animals and pathogens. The experts we spoke with, however, strongly objected to this scheme, indicating it would undermine ongoing efforts aimed at getting governments to focus on exotic invasive species. To this end, we changed Class 7 to *Invasive & Other Problematic Species & Genes* and subdivided it into categories of invasive species and problematic native species.

These taxonomies are now being rolled out and adopted. For example, they are now incorporated into The Nature Conservancy's project management software and are being used in projects around the world. The taxonomies are also being used by over a dozen US states as they develop comprehensive wildlife plans. As these taxonomies become more established and are used to roll-up information in project databases, there is obviously an increasing cost to changing and revising them. At the same time, however, it is also important that these taxonomies be improved and adapted over time. We thus invite you to visit http://www.conservationmeasures.org and provide your feedback.

It is our hope that if the conservation community can agree on common taxonomies, they will provide two immediate benefits. Firstly, they will help project teams decide what to do at their site. A team can scan the threats taxonomy and see if they recognize any threats they may be overlooking in their analysis of the conditions at their site, or scan the actions taxonomy and see if there are any actions that may wish to consider using. Secondly, they will enable mangers and donors to create general summaries or 'roll-ups' for broader organizational management purposes. Organizations or groups of organizations can build these taxonomies into reporting systems to tally the frequency of given threats and actions across projects.

More importantly, over time these taxonomies will hopefully provide an even greater benefit in that they will allow practitioners to search a database of conservation projects for projects facing similar threats or using similar actions, and thus learn how, why, and when certain actions succeed in abating particular threats. In other words, to facilitate cross-project learning and ultimately enhance the development of a full-fledged science of conservation.

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Note from the Editor

After more than 20 years working with Fauna & Flora International in various capacities, Simon Mickleburgh has moved to a new position at the Bat Conservation Trust, UK. For a number of years Simon played the leading role in research and writing for the popular Briefly news section, and more recently provided valuable editorial assistance to *Oryx*.