**Contributions of Indigenous Peoples and Local Communities to Biodiversity Conservation**

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**Abstract**

This paper reports a work in progress that aims to provide a global estimate of the contributions of Indigenous peoples and local communities to biodiversity conservation. It first describes the uncertainties that make such estimates difficult, which include definitions of what constitutes biodiversity conservation, the political nature of any mapped boundary and what constitutes indigeneity. The ethical issues involved in such aggregations of local data are then reviewed and the approach adopted described and justified. This includes a justification of the research itself in terms of costs and benefits, the adoption of fuzzy numbers, the reporting of percentages to no more than one decimal place rather than detailed mapped boundaries and an avoidance of attributing a purpose to land or sea management. A sample of the initial results are presented and current issues with the data collection and analysis are discussed.

**Introduction**

Across the world Indigenous peoples and local communities are playing a major role in the conservation of biodiversity. However, generalised statements on the extent of this support lack empirical global data, which weakens their impact on policy-makers. For many countries this is because the data are either missing or disputed, especially in countries where communal title and/or Indigenous peoples are not recognised by the State. There are other sources of uncertainty that have made reporting of contributions of Indigenous peoples and local communities to conservation at best difficult, at worst a source of conflict.

This paper describes the process and preliminary results of an attempt to aggregate available data at national, regional and global scales to estimate the contribution of Indigenous and local communities to biodiversity conservation. We acknowledge and accept risks associated with the aggregation process, but have attempted to provide safeguards to mitigate this risk and provide appropriate levels of anonymity and generality regarding results.

*Uncertainties*

Uncertainties that make quantification of contributions difficult include the following:

*Biodiversity conservation*: Outcomes of land or sea management can vary from ecosystems that retain all the animals and plants that lived there when records began (which can vary from decades to centuries) to places where many species, particularly the larger ones, have been extirpated as a result of human and/or ‘natural’ processes. Given the significance of many large animals in ecosystem architecture and function, the presence of these species is seen by some as essential components of a conserved landscape. However, these species may represent only a small proportion of the total biodiversity and are frequently absent from many long-settled landscapes deemed by society to have high conservation value (e.g. most European national parks).

*Boundaries*: Maps describe prevailing power structures. Rarely are they entirely undisputed, although many are settled by virtue of changing little over extended periods. Given the ongoing, often violent, history of dispute over land ownership and management between the State, Indigenous peoples, local communities and private interests, no boundary can be said to be ‘correct’ or have undisputed moral or even legal authority (i.e. even national laws can be considered unsound in international fora, and conflict with internationally agreed treaties).

Further, for many Indigenous peoples, ancestral domains or homelands are not defined spatially, but in terms of relationships. As such, ‘boundaries’ are representative of the relationships of certain people to place and, like all relationships, are contested and in a state of permanent flux. This is not easy to map and, in some cases at least, doing so may be seen as inappropriate.

*Indigeneity*: While long-disputed, definitions of Indigeneity are gradually being resolved through international fora such as the Convention for Biological Diversity and the International Labour Organisation. Even in Africa where multiple layers of settlement and colonisation have made definitions of indigeneity particularly contentious, there has now been agreement by the Council of African Nations that hunter-gatherer and nomadic pastoralist societies have been particularly disadvantaged despite a history of presence in the landscape extending back to before records began (Abbott et al. 1998; Rambaldi et al. 2006). However it has also been recognised by many groups, such as the ICCA Consortium, that local communities with long term traditional ties to land or sea also make substantial contributions to biodiversity conservation and, in some places, the ‘Indigenous’ and ‘local community’ are synonymous or there are complex historically-negotiated relationships that results in shared responsibility for land or sea management.

*Ethics and approaches to analysis*

Given these uncertainties, the ethics of any mapping need to be considered carefully before being undertaken at all. At a local level, ethical guidelines for participatory mapping of Indigenous territories already exist (Abbott et al. 1999; Rambaldi et al. 2006), and are being applied in many countries. Ethical guidelines for scaling up maps appear to be lacking. The following principles have been applied:

*Overall project:* Most Indigenous peoples and local communities are focussed on the local and do not feel they have the right to talk for land or sea to which they do not have a cultural connection. Thus mapping or any other grouping at larger scales is adopting a foreign worldview of questionable legitimacy for some of those whom the mapping is supposed to benefit: i.e. it is imposing the top-down approach that has caused Indigenous and local community disempowerment in the first place. On the other hand Indigenous peoples and local communities have always been influenced by external forces and within fluid boundaries. It is only the pace of change and the degree of pressure that has increased. Further, a failure to aggregate data may place Indigenous peoples and local communities at a disadvantage when negotiating rights, agreements and partnerships with entities operating at larger scales. For the purpose of this research, which is to make international/continental comparisons and aggregate contributions at a global scale, we deemed that the benefits of aggregation at the scale adopted (see below) outweigh the costs to those whose information is aggregated. We have attempted to ensure this by employing especially given the additional ethical safeguards (see below).

*Fuzzy numbers*. In our analysis most numbers are reported in the first instance as fuzzy numbers that afford equal weight to differing views regarding boundaries. This is a compromise given that some claims to boundaries may have greater veracity than others. However, given the dominance of State estimates of boundaries in most countries, any acknowledgement of the potential legitimacy of alternative boundaries is effectively empowering non-State views, including those of otherwise disempowered Indigenous peoples and local communities. That said, these upper and lower limits of fuzzy numbers express political aspiration and may not reflect effective reality. For this reason currently recognised national boundaries are used for some analyses, despite evidence that other tenure boundaries cross such State imposed delineations of territories. Secondly some analyses attempt to identify current political reality by making a best guess at the current true extent of Indigenous or local community control and management. This acknowledges that the State, whatever its legitimacy, usually attempts to constrain activities within mapped boundaries. However, it can also be used to acknowledge that State control is incomplete and that the use and management of lands by Indigenous peoples and local communities often continues in places from which they are supposedly excluded.

*Mapped boundaries and levels of accuracy*. Maps used to calculate land area are being sourced from publicly available data and used to calculate upper and lower limits of land under different forms of management. It is not intended to publish such maps. Instead the data will be published as percentages of country areas or, where country boundaries are not used, of areas within biophysical boundaries (e.g. continents). This decision is a compromise between transparency and a desire not to legitimise disputed boundaries. It is adopted because the purpose of the analysis is global comparison not within-country analysis. Thus percentages will be reported to one decimal place, at most and reporting may even be in deciles or coarser groupings of countries.

*Purpose of land and sea management*. No purpose for land and sea management has been assumed. National parks and many other forms of protected area usually have biodiversity conservation as at least one of their primary purposes. For Indigenous peoples and local communities, areas supporting biodiversity may or may not be conserved with the purpose of retaining the species that live there. As the purpose of management by Indigenous or local communities is rarely documented with full, prior and informed consent of the peoples concerned, none can be assumed for most sites. This is especially true given that, even when full, prior and informed consent has been obtained, it is often from Indigenous or community leaders, so may not reflect the views of disempowered community members (e.g. women or young people) and may not have been asked where respondents feel empowered (e.g. interviewees are from the dominant social group, people are not speaking on the land to which they have connection and over which they have legal title). Therefore assumptions are made only of the extent to which land or sea is managed in a manner consistent with biodiversity conservation.

**Methods**

Estimating the proportion of each country’s land and coastal seas that are owned or used by Indigenous peoples and local communities in a manner that is consistent with biodiversity conservation is proceeding as follows:

*GIS mapping*

*Indigenous land and sea*. Identifying the areas of land and coastal water in each country to which self-identifying Indigenous peoples maintain connection. Data for this estimate are initially obtained from any source available with a preference for Indigenous organisations where possible. This level of mapping is tenure-blind, which means that the entire continent of Australia is likely to be listed as retaining Indigenous connection despite a heavy colonial overlay of dispossession, even though there are many areas to which Indigenous people no longer have ready access. Rarely are the boundaries well defined and, where possible, upper and lower estimates are provided. These maps have the potential to provide a global tenure-blind estimate of the maximum area of land and sea retaining some level of Indigenous connection (assuming this has not been done already).

*Anthromes*. These maps are then overlaid with a GIS layer (Ellis and Ramankutty 2008, Ellis et al. 2010) in which the terrestrial land surface has been categorised into 19 anthromes (Table 1) depending on the intensity of human use and have already been used to help set conservation priorities (Martin et al. 2014). These range from urban to wild and barren lands. Intensively used anthromes (urban, residential, irrigated agriculture) are assumed not to be managed in a manner consistent with biodiversity conservation. Groupings of less intensively used anthromes are used to define upper and lower levels of land use intensity with associated assumptions about biodiversity and human engagement in management. No anthrome layer is currently available for marine use and, for the analysis, it is assumed that all marine areas to retain some level of biodiversity value, even if greatly degraded.

*Protected Areas.* These maps are further categorized using the database of protected areas from the World Conservation Monitoring Centre using the six categories of protection level (Table 2). Where polygons in this database overlap, the highest level of legal protection is assumed so no area has more than one category of protection. Areas recognised as having high conservation value (Ramsar and World Heritage sites, Biosphere reserves) are excluded if they are not also recognized as protected areas by the State in which they occur..

*Tenure classes*

The tables and maps from steps 1-3 describe the area of land in each country under differing levels of Indigenous connection, conservation tenure and land use intensity and provide the first baseline for analysis. This information is then combined with any other mapping and textual information to provide upper and lower estimates of a set of tenure types (Figure 1). This includes information on the types of tenure recognised by the State, particularly whether communal tenure is recognised and whether Indigenous peoples have any level of legal acknowledgement. For each category of use of land and sea, an estimate is also made of the value most likely to reflect conditions on the ground, with a justification of why a figure has been chosen. All areas are then calculated as percentages of either the terrestrial area or the area of coastal seas within territorial limits (12 nm) for the entire country.

*Peer review*

For each country the information is sent for peer-review to people identified in previous research as having knowledge of a country. Where possible, peer-reviewers include both government employees and those outside State governance systems. Individuals can act as peer-reviewers for more than one country. Those who contribute opinion are given the option of co-authorship of the final review paper that it is intended will emerge from this exercise. Contributors are also provided with the option of anonymity. All comments are being included in the final database, with permission, with figures for the upper and lower limits and best guess adjusted after discussion.

*Analysis*

Initial analyses are descriptive at a global or continental level to illustrate prevailing messages emerging from the data. Subsequent analyses will compare national data with other measures of social, economic or biophysical features of each country to determine the underpinnings of Indigenous and local community empowerment and contribution to biodiversity conservation.

**Results**

Initial work has concentrated on GIS mapping. Indigenous areas have been summarised for 234 of 254 areas of land for which analysis is intended. GIS mapping of anthrome and protected areas has been completed for 104 of these areas, with a total area of 62 million km2.

One obvious trend of the preliminary anthrome data is that substantial areas within Category I-IV parks, sometimes characterised as strict national parks, have intensive land use within their borders. While some of this may be boundary effects, with settlements close to the borders of protected areas affecting the score for entire pixels, it does demonstrate that the actual area being managed for conservation away from human settlements is rather less than is reported through the area declared as protected alone. Secondly (see Table 3 for Sweden as an example) there are in some countries large areas of Category I-IV parks that are managed by Indigenous peoples, either officially or unofficially, largely in a manner that is likely to have little impact on the biodiversity. Thirdly there are substantial areas outside the protected area system that have anthromes indicative of management consistent with biodiversity conservation (Table 3). The extent to which these are private, Indigenous or local community land has yet to be determined but the preliminary results confirm that much can be achieved for conservation through dialogue, negotiation and resource transfer to the often poor communities who using these lands. This is not new but the final results will provide a new measure of the extent and location of where these lands occur.

The protected area data as a whole suggests that over half of all State-protected areas are used to some extent by Indigenous peoples or local communities and that the area of non-protected State land that is managed by Indigenous peoples or local communities in a manner consistent with biodiversity conservation is more than double the area protected by the State in any form. This area is itself exceeded by the area with similar management outside State lands managed by Indigenous peoples or local communities (Table 4). Whether this holds up across all lands remains to be seen after peer-review of the results and analysis of the uncertainty in the estimates. The situation is very different for coastal and marine areas where the State has relinquished ownership and control in few countries.

**Discussion**

*Uncertainties*

One of the major results of analyses currently undertaken is the huge uncertainty in many countries about the extent to which Indigenous peoples and local communities contribute to biodiversity conservation. This will be reduced by peer review, and it may be possible to attribute uncertainty to different factors in at least some countries, but is nevertheless an interesting result in itself. Essentially international reporting by most countries reflects a State view of reality that is often quite different to what other sources of information suggest is happening on the ground. In particular the progress towards the Aichi targets of 17% of the land area and 10% of marine areas is a sham without major accommodation of Indigenous peoples and local communities who are using those areas, either legally or illegally.

*Ethics*

The ethical approaches adopted for this research may not have considered all the issues necessary and the field is still being explored. Of greatest concern is where local communities and Indigenous peoples are in conflict over boundaries and responsibilities, either internally or with each other. In sites where there are disputes, from local to national. The final products will need to be assessed carefully to ensure that they do not exacerbate or generate conflicts. We have adopted protocols which we hope will reduce the chance of this happening but will be seeking wider advice before final publication of any results.

*Contributions*

The initial results suggests that Indigenous peoples and local communities manage country in a manner consistent with biodiversity conservation over enormous parts of the globe, whether within protected areas, on State lands outside protected areas or on land over which the State acknowledges their ownership. Again these results are preliminary and warrant deeper analysis before they can be confirmed. The novelty will be a stronger empirical basis for the long-held belief in this contribution and greater understanding of where this contribution is occurring.

**Conclusion**

The research has necessitated consideration of at least some of the ethical issues involved in scaling up information from the local to the global in reporting on what are local connections and actions. Given the option to proceed in the light of the ethical trade-offs necessary, it is hoped this work will provide a stronger empirical base for advocates of the role played by Indigenous peoples and local communities in biodiversity conservation. It will also expose the huge uncertainty surrounding existing reporting by countries on the extent of their protected area conservation and emphasise the extent to which Indigenous peoples and local communities must be consulted and accommodated if biodiversity conservation has any hope of meeting global targets. The work is unfinished but it is intended to provide more complete drafts at a country level for peer review during June 2015 with the intention of the first products appearing in the northern autumn of 2015.

**Acknowledgements**

We greatly appreciate the contributions to and advice on this research from contributors to the World Parks Congress symposium on this topic Ashish Kothari (Asia), Bev Sithole (Africa), Gonzalo Oviedo (Latin America), Val Courtois (North America), Alifereti Tawake (Oceania), Joe Morrison (Australia), Pernilla Malmer (Europe). We would also like to express our gratitude for the effort and advice put into the project by our colleagues Tom Duncan, Dermot Smyth, Cathy Robinson, Colleen Corrigan and Marc Hockings.

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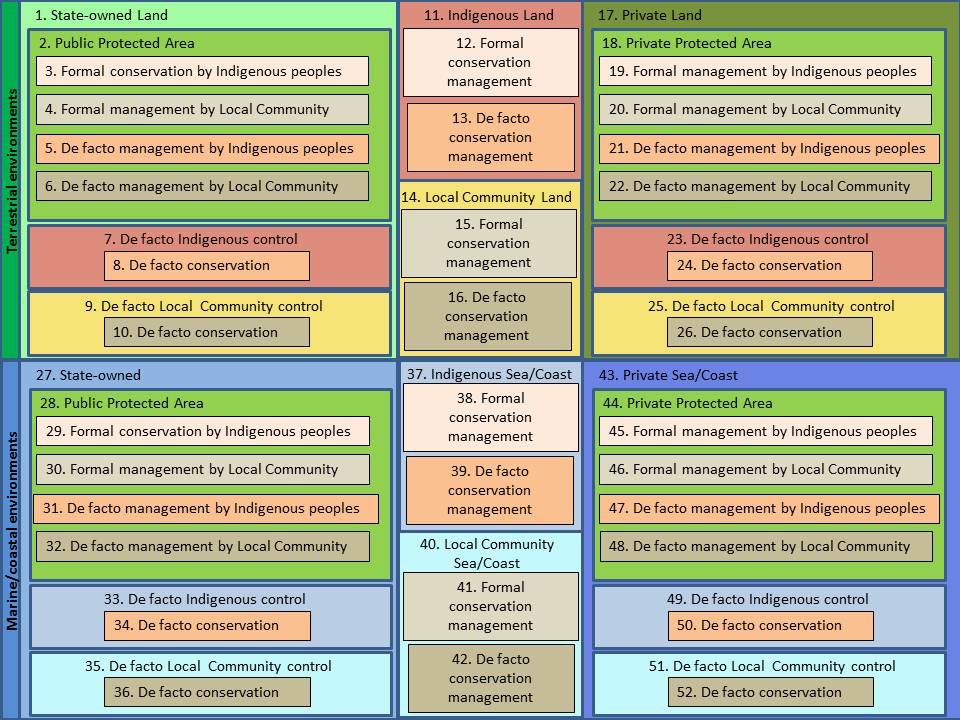
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**Figure 1. Conceptual map of tenure and land management activities for which areas are being estimated for each country.**



**Table 1. Anthromes** Types and assumptions about the extent to which anthromes are likely to be managed in a manner consistent with biodiversity conservation and to which Indigenous people or local communities may be involved in management

|  |  |  |  |
| --- | --- | --- | --- |
| **Anthrome type** | **Biodiversity conservation** | **Indigenous or local community management** | **Notes** |
| Urban | Nil | High | Biodiversity present persists despite human use |
| Dense Settlement | Nil | High | Biodiversity present persists despite human use |
| Rice Village | Nil | High | Biodiversity present persists despite human use |
| Irrigated Village | Nil | High | Biodiversity present persists despite human use |
| Rainfed Village | Nil | High | Biodiversity present persists despite human use |
| Pastoral Village | Nil | High | Biodiversity present persists despite human use |
| Residential Irrigated Croplands | Low | High | Biodiversity present sometimes requires human use |
| Residential Rainfed Croplands | Low | High | Biodiversity present sometimes requires human use |
| Populated Croplands | Low | High | Biodiversity present sometimes requires human use |
| Remote Croplands | Low | High | Biodiversity present sometimes requires human use |
| Residential Rangelands | Low | High | Biodiversity present sometimes requires human use |
| Populated Rangelands | Low | High | Biodiversity present sometimes requires human use |
| Remote Rangelands | High | High | Human use impinges little on most biodiversity present |
| Residential Woodlands | Low | High | Biodiversity present sometimes requires human use |
| Populated Woodlands | High | High | Human use impinges little on most biodiversity present |
| Remote Woodlands | High | High | Human use impinges little on most biodiversity present |
| Inhabited Treeless and Barren Lands | High | High | Human use impinges little on most biodiversity present |
| Wild Woodlands | High | Low | Little active human use but may be culturally protected enabling unimpeded biodiversity use |
| Wild Treeless and Barren Lands | High | Low | Little active human use but may be culturally protected enabling unimpeded biodiversity use |

### Table 2. IUCN Protected Areas Categories System[[1]](#footnote-2) IUCN protected area management categories classify protected areas according to their management objectives. The categories are recognised by international bodies such as the United Nations and by many national governments as the global standard for defining and recording protected areas and as such are increasingly being incorporated into government legislation. Categories I-IV are sometimes listed as ‘strict’ protected areas.

|  |  |
| --- | --- |
| **Reserve category** | **Description** |
| Ia Strict Nature Reserve | Category Ia are strictly protected areas set aside to protect biodiversity and also possibly geological/geomorphical features, where human visitation, use and impacts are strictly controlled and limited to ensure protection of the conservation values. Such protected areas can serve as indispensable reference areas for scientific research and monitoring |
| Ib Wilderness Area | Category Ib protected areas are usually large unmodified or slightly modified areas, retaining their natural character and influence without permanent or significant human habitation, which are protected and managed so as to preserve their natural condition. |
| II National Park | Category II protected areas are large natural or near natural areas set aside to protect large-scale ecological processes, along with the complement of species and ecosystems characteristic of the area, which also provide a foundation for environmentally and culturally compatible, spiritual, scientific, educational, recreational, and visitor opportunities. |
| III Natural Monument or Feature | Category III protected areas are set aside to protect a specific natural monument, which can be a landform, sea mount, submarine cavern, geological feature such as a cave or even a living feature such as an ancient grove. They are generally quite small protected areas and often have high visitor value |
| IV Habitat/Species Management Area | Category IV protected areas aim to protect particular species or habitats and management reflects this priority. Many Category IV protected areas will need regular, active interventions to address the requirements of particular species or to maintain habitats, but this is not a requirement of the category |
| V Protected Landscape/ Seascape | A protected area where the interaction of people and nature over time has produced an area of distinct charcter with significant, ecological, biological, cultural and scenic value: and where safeguarding the integrity of this interaction is vital to protecting and sustaining the area and its associated nature conservation and other values. |
| VI Protected area with sustainable use of natural resources | Category VI protected areas conserve ecosystems and habitats together with associated cultural values and traditional natural resource management systems. They are generally large, with most of the area in a natural condition, where a proportion is under sustainable natural resource management and where low-level non-industrial use of natural resources compatible with nature conservation is seen as one of the main aims of the area |

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**Table 3. A draft analysis of protected areas, anthromes and Indigenous/local community use of land in Sweden** (data are % total land area of Sweden apart from last two rows)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sweden | | Human use | Indigenous/Local community | State |
| Park categories I-IV | | Intensive | 0 | 0.3 |
|  | | Extensive | 1.7 | 0.5 |
|  | | Very little | 7.0 | 0.1 |
| Park categories V + VI | | Intensive | 0 | 0.5 |
|  | | Extensive | 1.0 | 0.3 |
|  | | Very little | 1.8 | 0.3 |
| Outside protected areas | | Intensive | 1.0 | 15.5 |
|  | | Extensive | 20.1 | 26.6 |
|  | | Very little | 17.3 | 0.2 |
| Unknown | |  | 0.2 | 1.4 |
|  | |  |  |  |
| Park categories I-IV | | % I-IV PA area |  |  |
|  | | Intensive | 0.1 | 3.1 |
|  | | Extensive | 17.3 | 5.3 |
|  |  | |  |  |

**Table 4. Total area estimated after preliminary analysis of data from 104** countries (62 million km2 land area, 13 million km2 marine and coastal areas)

|  |  |  |  |
| --- | --- | --- | --- |
| **Area class** | **Lowest** | **Highest** | **Best guess** |
| *Terrestrial areas* | |  |  |
| State protected lands with little human use | 4.1 | 7.6 | 5.7 |
| All protected State lands | 8.5 | 16.9 | 12.9 |
| Other areas where Indigenous or Local Community occupancy is likely to be consistent with biodiversity conservation | 7.2 | 19.8 | 15.5 |
| All areas where Indigenous or Local Community occupancy is likely to be consistent with biodiversity conservation | 11.6 | 29.1 | 22.7 |
| Private protected areas | 1.5 | 3.4 | 2.3 |
| *Coastal and marine areas* | | |  |
| Protected State marine and coastal areas with little human use | 10.1 | 11.0 | 10.6 |
| All protected State marine and coastal areas | 10.7 | 11.9 | 11.4 |
| Other areas where Indigenous or Local Community occupancy is likely to be consistent with biodiversity conservation | 0.5 | 4.3 | 1.0 |
| All areas where Indigenous or Local Community occupancy is likely to be consistent with biodiversity conservation | 3.7 | 10.4 | 5.7 |

1. http://www.iucn.org/about/work/programmes/gpap\_home/gpap\_quality/gpap\_pacategories/ [↑](#footnote-ref-2)