Transfrontier Conservation Areas

Conservation and Socio-Economic Impact Indicators

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1. Introduction

Transfrontier Conservation Areas (TFCAs) refer to relatively large areas of land, straddling international borders between two or more countries that incorporate natural systems around one or more protected areas. These protected areas can include a variety of land holdings, including national parks and game reserves, private and communal land, forest reserves and wildlife management areas. TFCAs may allow a number of different land uses and types of natural resource utilisation within their boundaries, including some consumptive use.

The three primary aims of TFCAs are the conservation of biodiversity, socio-economic development and the promotion of a culture of peace and cooperation. This paper deals with monitoring the impact of TFCAs on the first two objectives.[1]

Over the last decade, several methodologies for assessing conservation activities have been developed, ranging from species population and nested plot-level habitat assessments to rapid appraisal and project cycle management approaches. However, a systematic approach has not been generally adopted and there is no objective method to comparatively assess conservation results. Thus, the evaluation of investments in conservation is difficult to determine with accuracy and a comprehensive, scientifically rigorous system for measuring conservation success is required. The aim of the conservation outcome monitoring model described in Section 2 of this paper is to build on past efforts and develop a set of indicators to measure and report achievements according to defined conservation outcomes. Indicators for species, area and corridor goals are described.

In addition to this lack of systematic development of conservation indicators, there has also be an almost complete lack of research regarding the economic and livelihood impacts of conservation programmes within TFCAs. In order to address this dearth of information, a programme of research is being developed and implemented by the Transfrontier Conservation Unit at Conservation International, which will pilot these monitoring methods in two TFCAs in southern Africa. Section 3 of the paper describes the proposed research and methods, and discusses some of the issues surrounding the expected socio-economic impacts of TFCAs.

2. Overview of Conservation Monitoring

As biodiversity conservation is generally accepted to be the primary goal of TFCA development, ensuring that this is successfully achieved is of great importance. As such, this monitoring plan (developed by Conservation International) – initially for biodiversity Hotspots and Wilderness Areas – can be easily utilised to suit the needs of TFCAs. This framework was developed to measure conservation success and improve on-the-ground conservation action. Initially, monitoring of conservation outcomes will focus on state/impact assessment. That is, measuring and documenting results towards achieving a desired change in a system – answering the question 'how well are we doing?' in order to improve the ability to achieve stated goals. Outcome monitoring is not intended as a complete monitoring system. The indicators proposed for outcome monitoring are considered to be practical, achievable, globally applicable and strongly correlated to achievement of outcomes. As it would be too complex to try to monitor every aspect of each environment, regular measurement of indicators can quantify and simplify these complex realities to show trends or changes in the state of a system, population or individual. The primary purpose of outcome monitoring is thus to consistently measure progress towards achieving outcomes including extinctions avoided; areas protected (to conserve threatened and restricted-range species); and corridors created (to ensure long-term viability of areas protected and to conserve species that cannot be conserved at a site level).

While much of the actual monitoring will be done at the area or site level, outcome monitoring is particularly concerned with describing the state of conservation at the eco-region/corridor scale and is therefore also applicable at the TFCA level. While in Hotspots, the primary focus is to protect and restore populations of species classed as threatened on the Red List, in Wilderness Areas and TFCAs, the focus is on maintaining intact faunal assemblages and avoiding future Red Listings of species. Thus, in Hotspots the monitoring focus will be more heavily weighted toward species measures while in Wilderness Areas and TFCAs it will tend toward corridor measures.

Given that this framework is designed to measure conservation achievements, it assumes that baseline outcome definition is complete and that all outcomes are biologically defined. Since outcome definition refinement has not occurred in many regions, monitoring can be initiated on existing defined outcomes until more thorough analysis is completed. (That is, the elements necessary for successful biodiversity conservation have been identified and are a quantifiable set of conservation goals to reduce biodiversity loss and achieve the biological and social goals of programmes in each Hotspot, Wilderness Area or TFCA.)

There are six core indicators: two each for species, areas and corridors. There are also some supporting measures for each of these outcome levels. Achievement of outcomes will be assessed by the six core indicators and not by the supporting measures. The supporting measures will improve understanding of whether the achievement seen in the core indicators is real and sustainable, or an artefact of time lag or some other effect.

Many of the supplementary measures relate to either outputs (e.g. demarcation of park boundaries or enforcement of conservation legislation) or achievement of milestones (e.g.

reduced commercial exploitation of threatened species or reduced numbers of invasive species). They are designed to provide a better understanding of pressures which will in turn improve the ability to assess the sustainability of outcomes.

2.1 Species indicators

These indicators cover CI's 'Extinctions Avoided' outcomes. Currently these include threatened species and restricted-range species. (Work is currently underway to identify these species for each region.) Restricted-range species have already been identified for birds (Stattersfield 1998) and it will be possible to identify further restricted-range species as the Global Amphibian and Global Mammal Assessments are finalised over the next two years.

2.1.1 Number of threatened species is reduced

This indicator is measured by the percentage change in number of threatened species in each IUCN Red List category, the number of species downlisted and the number of species that have gone extinct.[2]

Species may be downlisted or uplisted due to a real change of conservation status or due to reasons of taxonomic change or improved knowledge. It is important to list the number of species downlisted from each category due to a real change in conservation status – ensuring that other changes have been separated out. If this is not done, successes with a couple of species could be lost in a wider wave of negative change.

2.1.2 The most threatened species avoid extinction

This indicator is percentage improvement towards achieving downlisting of each threatened species, concentrating on rates of decline, starting with Critically Endangered species.[3]

Removing species from and even downlisting species within, the Red List is a slow and difficult task. Population-level studies can help to measure the incremental changes towards achieving this task for the most threatened species. While a number of factors (extent of occurrence, area of occupancy, number of locations at which a species occurs and number of mature individuals in the population) contribute to the Red Listing of a species, the most significant aspect (featuring in approximately 70 per cent of listings) is a decline in one of these factors listed. The limited number of remaining species is listed not because of declines, but solely due to a very small population or very small range (which are often natural vulnerabilities that cannot be countered by conservation action). Thus, it is obvious that one of the key things to address is declines of threatened species. Ideally declines will not just be slowed or stopped but also reversed. However, as a first step this indicator concentrates on slowing and stopping declines.

Studies can be most efficiently carried out in an area that has several threatened species, so that some of the data collected will be useful for more than one study. Ideally, a study will take place across the entire range of a species, but more often a study in one part of the species' range can

be used to indicate how well a species is doing over its entire range. Obviously care will need to be taken in choosing a subset of the species' range that is expected to be most representative.

The most urgent priority is to downgrade species from the Critical level. Once Critical species are all being studied, Endangered species are the next highest priority for study. In wilderness areas, there are few threatened species, but modelling of future land-use change may show extensive and sizeable pressures over much of the range of currently non-threatened species. Such models allow inclusion of species on the Red List under criterion A3.

2.2 Area indicators

These indicators cover CI's 'Areas Protected' outcomes for Key Biodiversity Areas, including new protected areas, improved management of existing areas and conservation in indigenous areas. Key Biodiversity Areas at which these indicators should be measured include sites at which critical or endangered species are regularly present and sites at which significant numbers of a vulnerable or restricted-range species are regularly present.

2.2.1 Key biodiversity areas are formally protected

This indicator can be described as the total number of all Key Biodiversity Areas that are protected with (a) legal recognition or binding contractual protection and (b) biodiversity conservation as an official goal (e.g. national park, private protected area, easement, conservation concession or multiple use protected area/community land/indigenous reserve/land under corporate management with declared boundaries and biodiversity conservation as a goal).[4] Responses should also include area (hectares) of these protected sites in total; area protected as a core zone (no extractive/consumptive uses permitted); and area protected as a multiple-use zone.

This indicator allows the measurement of regional and local variations of protected areas and accounts for both the creation of new areas and the modification (or formalisation) of the goals of existing areas. It is therefore a relatively complete way to capture the number of Key Biodiversity Areas protected both by controlled use and no-take zones.

The requirements that sites protected have both legal recognition and a conservation goal are intended to ensure that only sites which are most likely to contribute to conservation in the long-term are included. For example, an indigenous area with a clear statement of conservation objectives, in whatever form is locally appropriate, is more likely to promote those objectives in the long-term than a similar area that happens to protect biodiversity only because of low population density. These requirements may nonetheless leave out key areas that are likely to function for long-term conservation.

2.2.2 Habitat is conserved at protected key biodiversity areas

This indicator is the change of original habitat cover at protected Key Biodiversity Areas.[5] This indicator is recommended because the quantity of habitat is among the indicators most highly correlated with the ability of species to persist at any site. Further, changes in habitat cover can

be measured by classification of satellite images and other remote sensing analyses, which makes it possible to generate (at comparatively low cost) a detailed picture of habitat change across large areas. While change in habitat cover does not capture many issues of habitat quality, these effects will often be addressed by the species studies described above and measuring habitat quality across a large area is prohibitively expensive and time-consuming.

2.3 Corridor indicators

These indicators cover CI's 'Corridors Created' outcomes and currently cover the extent and distribution of suitable habitat for wide-ranging and migrant species. These indicators are particularly useful at the TFCA level.

2.3.1 Connectivity allows natural biotic interactions

This indicator is a habitat cover fragmentation statistic – specifically patch size distribution and distance to edge distribution.[6] The indicator should be used because the effects of habitat fragmentation include changes in ecological processes and functions. Although present ability to predict specific changes is limited, it is recognised that habitat fragmentation is one of the most important threats to ecosystem integrity. As stated above, it is recognised that change in habitat cover does not capture many issues of habitat quality that might affect species population levels. These effects will largely be captured by the species studies described in indicator two.

It is recognised that this indicator may not capture changes due to selective logging (only intensive forms) and additional research and development will be necessary to operationalise several emerging tools.

2.3.2 Key biodiversity areas have sustained viability and land-use allows natural biotic interactions

This indicator is described by a percentage change in suitable habitat for corridor-level species.[7] Current knowledge about how ecosystems are affected by landscape fragmentation suggests that fragment size and influences of edge effects and the surrounding matrix are key determinants of this indicator. In most cases, there is very limited understanding of how species use non-native matrix habitats. Generating data on how various species use matrix habitats will increase knowledge about which land uses are compatible with species recovery and survival and improve corridor design principles and guidelines.

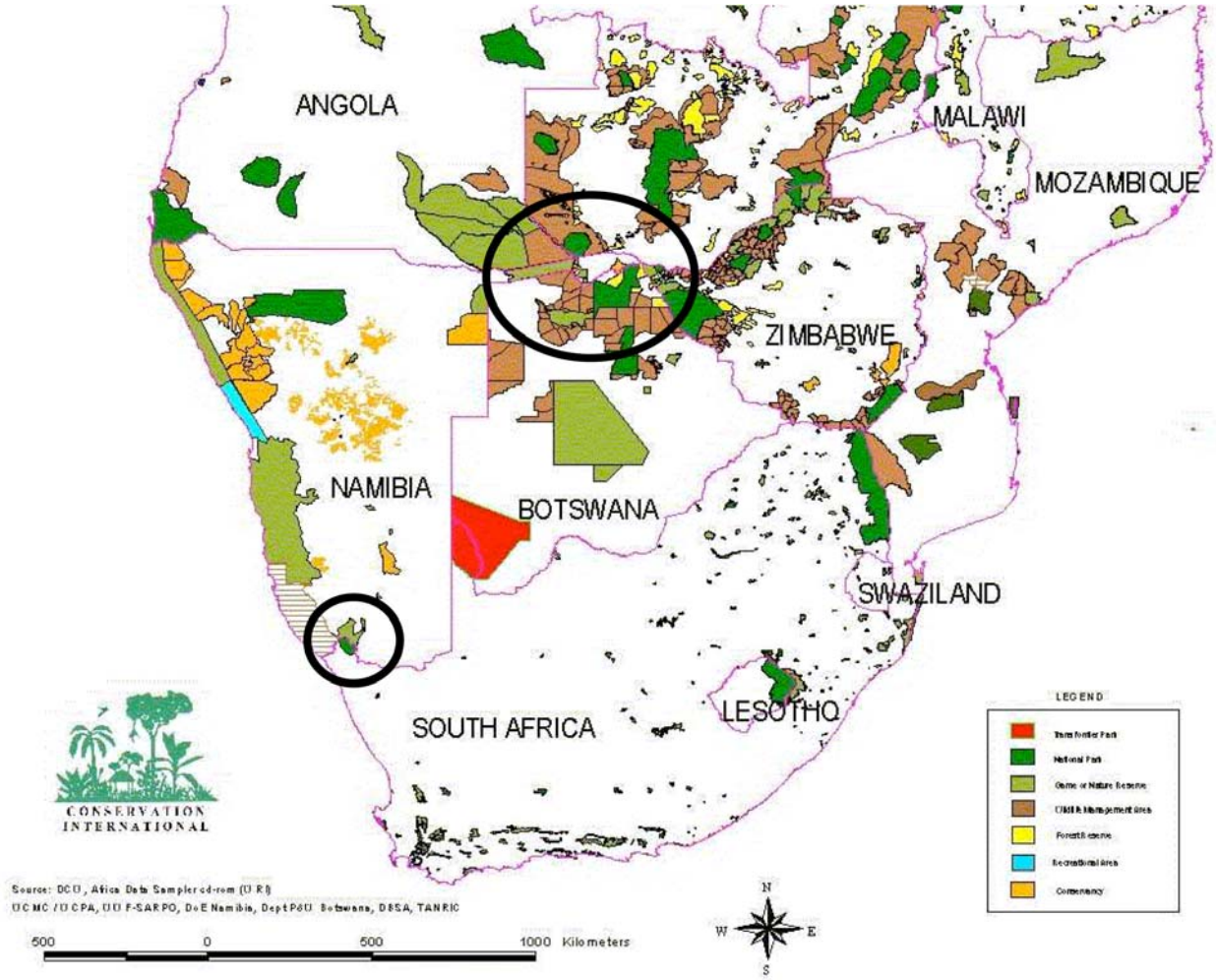
3. Overview of Economic Impact Monitoring

Although it appears that the establishment of TFCAs could create much needed economic activity and sustainable jobs that yield beneficial effects in local economies, the economic analysis needed to support this is so far lacking. Improved understanding is critical to local communities' appreciation of, and ability to access, the potential economic benefits of protected areas and other forms of conservation areas, to the private sector to facilitate financial investment and to policy makers to make educated decisions regarding land use alternatives.

As yet no indicators have been chosen, but a description of planned research and activities is outlined below – which will include the selection of indicators and the implementation of a monitoring plan.

The purpose of this research is to determine the economic impacts of TFCAs on local and regional economies. A second, but no less important purpose is to determine the impact of TFCAs and associated developments on local livelihoods. The study will focus on two TFCAs at different stages of development – the Richtersveld/|Ai |Ais TFCA, shared between South Africa and Namibia, and the Okavango/Upper Zambezi TFCA shared between Namibia, Botswana, Zimbabwe, Zambia and Angola (see Map 1). The former is also potentially the lower section of the proposed Three Nations Namib Desert TFCA that will eventually extend along the coast of Namibia into Iona National Park in Angola.

Map 1 Richtersveld/|Ai |Ais and Okavango/Upper Zambezi TFCAs



This research is specifically designed to address the information needs in each of these TFCAs regarding any economic impacts at the regional economy level, by initially establishing the structure of the local economy and over the medium to long term, monitoring any changes in structure resulting from the implementation of TFCAs and other conservation interventions within their boundaries. At the household level, current/existing livelihood strategies and natural resource utilisation patterns will be determined and changes in these patterns resulting from TFCAs and conservation interventions will also be monitored. Analysis of change over time will attempt to separate out TFCA-related changes from general trends in economic activity in each country/region. This analysis will initially track the size of each of these main industries, but will also be flexible enough to note the growth of new industries that may emerge as the result of TFCA or conservation intervention implementation.

The purpose of looking at both the regional and household-level is to improve the understanding of the distribution of impacts resulting from TFCAs. This is crucial when trying to ensure that those who are most likely to suffer the costs associated with successful conservation (e.g. increased human–wildlife conflict incidents) also receive the greatest benefits.

Unlike the conservation monitoring framework outlined above, the purpose of these monitoring efforts is to observe the changes that take place, rather than to provide information regarding the achievement of targeted outcomes. That is, the indicators, when chosen, will not reflect implementation progress (or impact targets), though of course implementation progress will be noted in attempts to understand the cause of impacts.

The study is divided into two major components – the collection of baseline information (regarding the structure of local economies and regarding livelihood strategies and natural resource utilisation patterns of residents); and the development of a methodology for monitoring impacts at both local/regional economy and household level (i.e. establishing and collecting indicators) that is compatible with, and can be implemented in conjunction with the conservation monitoring.

It has been said that TFCAs and other conservation interventions can contribute to poverty reduction through the development of natural resource-based enterprises and community involvement in industries such as tourism. It is expected that the level of economic and livelihood impacts will be dependent on a number of factors, including (but not limited to) the number of possible livelihood strategies and economic activities in a region, population density and – given the high reliance on tourism to provide local jobs and generate income – the tourism potential of the region. In general, major impacts on regional economies are not expected, and will arise primarily from the development of the tourism industry (both consumptive and non-consumptive) and possibly also from the development of new activities based on the new or commercial utilisation of natural resources. The most significant predicted impacts at the household level are most likely to be changes in natural resource utilisation patterns – more sustainable harvests and/or newly commercialised utilisation of resources. Given the small expected impacts relative to the widespread poverty of these regions, it is useful to look at the contribution of TFCAs in terms of their contribution to sustainable economic development based

on the growth of industries that sustainably utilise natural resources and can provide income and employment to residents.

Additionally, given that the primary objective of TFCAs for conservation organisations is the conservation of biodiversity, it may be possible to consider them as useful interventions if they have positive conservation outcomes, even if their positive economic and livelihood impacts are small – provided they are a well integrated element of a broad rural development strategy. If this were the case, rural economic development could take place while ensuring long run environmental sustainability. However, it must be noted that TFCAs will ideally provide relatively large economic and livelihood benefits, and it is hoped that this research can contribute to the discussion of how best to maximise benefits and minimise costs. Such monitoring is also necessary to ensure that any negative impacts from TFCA interventions are quickly identified and mitigated.

3.1 Natural resource accounts

The processes outlined above that are designed to measure change at the regional economy level do not take into account the depletion or degradation of environmental assets that result from economic activity, and can thus overestimate the value of economic activity (and potentially encourage growth at the expense of natural/environmental assets). The construction of a basic set of natural resource accounts (NRA) will be evaluated to determine their usefulness in contributing to improved information about the contribution of TFCAs to sustainable local economic development.

Natural resource accounts are designed to measure the stock and uses (flow) of different resources such as water, forests, wildlife, etc., both physically and monetarily. They can thus provide information regarding the efficiency of resource use across economic sectors, and combined with quality scientific/biological data can provide information regarding the over-exploitation (or non-sustainable use) of particular natural resources.

Given the quantity and quality of data necessary to construct full stock, flow and monetary accounts, initial development is likely to focus on physical flow, and possibly monetary, accounts. The construction of natural resource accounts should also contribute to the collection of data useful for monitoring the biodiversity conservation aspect of TFCAs.

3.2 Links between conservation and economic impact monitoring

A number of the supplementary measure indicators within the conservation outcome monitoring framework are closely linked to the objectives of the socio-economic monitoring programme, and efforts will be made to integrate the collection of data and analyses of these indicators. The indicators (or aspects of them) already identified as being ‘shared’ between the two programmes are briefly described below.

Permitted use – evaluation for legally permitted major uses (or in the case of some areas, permitted by traditional law), including scientific study, low impact tourism, other non-

consumptive non-extractive uses, non-commercial use by local residents and sustainable commercial use. This information can be useful in determining political, social and legal support for conservation at the site.

Implementation of management – including (but not limited to) the number of personnel enforcing management goals, the type and flow of benefits to local residents (such as employment and revenue sharing agreements).

Infrastructure development – there is substantial evidence that demonstrates a correlation between habitat destruction and proximity infrastructure projects. Incorporating spatial distribution of existing and proposed infrastructure should improve corridor design and effectiveness.

Land use plans – the existence of formal land use plans, land titles and land use legislation clearly establishing parameters for development. Identification and monitoring of zoning considerations including provisions for buffer zones and legislation of resource use rights.

4. Conclusion

The aim of each of the monitoring processes is quite different. The monitoring of conservation outcomes is designed to improve the ability of implementing agencies to achieve stated conservation goals, while the aim of the socio-economic monitoring is to observe changes resulting from the implementation of TFCAs and not to measure the achievement of targets. In time, the analysis of results of the economic monitoring may enable the identification of processes/institutions that maximise benefits and/or minimise costs resulting from TFCAs, and thus may change into a process to track the achievement of targets. Even if this change does not occur, lessons should be learned regarding the maximisation of benefits and minimisation of costs and should be widely applied in the development of TFCAs.

The two processes outlined above are not comprehensive, and will be refined over time as data availability and quality improves, and if additional or alternative indicators can be shown to be more useful in analysing impacts on biodiversity, livelihoods or economies. It is crucial that methods are applied consistently across regions and through time to allow comparisons. Original data and analyses will be retained to permit reanalysis as outcomes are refined and increases in knowledge and understanding result in changes in thresholds and methods for measurement. The conservation outcome monitoring framework will be phased in over the next two to five years. Unless capacity permits, not all of the conservation indicators will be completely and immediately implemented. It is anticipated that regions will add more species, areas, etc., as capacity and knowledge increases.

It is expected that it will be some years before the impacts of TFCAs are fully felt/observed. Thus, a long term commitment – not only to the implementation process, but also to monitoring and evaluation – is required from implementing agencies and other affected parties. The results of such monitoring processes should, over time, enable successful adaptive management of TFCAs as well as providing information regarding the best ways to maximise the benefits and

minimise the costs flowing from TFCAs to local communities and regional economies. While different skills and capacity are required to collect and analyse the results of these two monitoring systems, data collection processes should be integrated and/or synchronised where appropriate to ensure duplication of efforts is avoided.

Notes

[1] See Hammill, A., and Besançon, C. 2003. 'Peace and conflict impact assessment – An emerging tool for TBPA planning and monitoring.' for further details on the role of TFCAs in the promotion of a culture of peace and cooperation.

[2] Percentage achievement for each year can be measured by subtracting the number of species in a given category in one year from the number in the previous year and then dividing this by the number from the previous year. The categories considered should be Vulnerable, Endangered, Critically Endangered and Extinct in the Wild/Extinct (the latter two combined).

[3] It is important to first identify how to measure the rate of population decline of a species. Around 40% of declining species are listed under (at least) categories A or C1 and thus have estimated rates of decline intrinsically recorded in the Red List.

For the species for which background rates of decline are known, it is possible to monitor decline rates into the future (directly, or using appropriate surrogates as listed for the species) and thus percentage achievement towards stopping declines. Percentage achievement per species per year will be (decline in previous year minus decline in current year) divided by decline in previous year. While such changes in decline rates may not be significant year by year (due to natural fluctuations, margins of error, etc.), cumulative multi-year monitoring will identify real changes in decline rates. As an indicator, it is most useful to present the mean value for all species studied of all such achievements towards stopping decline. The number of species for which success was achieved (i.e. declines stopped or slowed) should be listed.

[4] Overlay existing protected area maps with the maps of Key Biodiversity Areas and calculate the following: a) number of sites protected and unprotected; b) area of protected sites; c) area protected as core zones; and d) area protected as multiple-use zones. It is also important to measure any major changes in internal zoning (e.g. creation of core zone from multiple use zones) and reductions in sites protected (e.g. de-gazetting a protected area or retraction of the biodiversity conservation goal in an indigenous area). Changes resulting from improved mapping of Key Biodiversity Areas or protected areas should be noted.

[5] Satellite image-based change detection (both 500m and 30m resolution) with validation by aerial photography and ground surveys when possible. Periodic (e.g. annual) change detection at 500m resolution from MODIS images should be undertaken making use of existing methodologies and products. Only basic statistics of area cleared by region should be calculated from these change detections.

[6] Fragmentation statistics compare spatial indices of shape and size, proximity and isolation, connectivity and diversity of classes of land cover types. The deforestation maps generated in indicator four provide the basis for conducting fragmentation statistics.

[7] Species could be identified through the WCS landscape species framework, could be long-distance migrants, or could be species that undertake sizeable local (e.g. altitudinal) migrations. All such species that cannot be conserved at the site level will be identified as part of corridor-level outcome definition. For each species, habitat requirements will need to be identified.

Species-specific studies will have to be conducted to assess which land uses constitute suitable habitat. Suitable habitat is defied by scientific evidence that land is used for breeding, feeding or other significant biological functions for corridor-level species. Once land uses are identified as suitable, supervised classification categories for each land use can be integrated into the satellite image-based change detection that is conducted for indicators four and five.

The first pass for 'suitable habitat' should be fallow and young secondary forest (e.g. natural and agricultural fallows, carbuca, conservation coffee). Change detection for fallow will have less precision that forest change detection (older fallows can be confused with mature forests). The second target for 'suitable habitat' types might include agriculture and pasture, but there is little information about the appropriate timing for imagery to best assess change.

References

Stattersfield, A.J., Crosby, M.J., Long, A.J. and Wege, D.C. 1998. *Endemic bird areas of the world: Priorities for biodiversity conservation*. BirdLife International, Cambridge.

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