Update and Guidance on Ecometrica's Normative Biodiversity Metric Methodology

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Introduction

The Normative Biodiversity Metric (NBM) is a practical method for assessing the biodiversity performance of any land-owning entity. The NBM is designed to assess the habitat quality of all the land owned by an organisation, generating a quantified biodiversity score. This score can be used to track the ongoing land management performance of an organisation over time - not to make comparisons between different companies, or between the value of different biomes or ecosystems.

The accounting framework presented in *Corporate Biodiversity Accounting* (Jarrett 2012) is used to calculate biodiversity key performance indicators which can be used in the corporate reporting process.

This document follows on from *Assessing Organisational Biodiversity Performance* (Jarrett 2011) which provides an introduction to the methodology, and *Corporate Biodiversity Accounting* (Jarrett 2012) which describes the reporting of biodiversity information, and provides:

   a) More information on the steps involved in carrying out NBM assessments; and

   b) Information on how Ecometrica's *Our Ecosystem* software can be used to carry out NBM assessment (an online case study will be available soon at nbm.ourecosystem.com)[1].

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[1] It should be noted that NBM assessments can be done independently of using *Our Ecosystem*, and use of the methodology is free and encouraged. We would also welcome feedback on this guidance document, and the methodology in general. This document incorporates feedback received from various parties on the methodology.

Step 1: Compile an inventory of owned land

The first step of the assessment is to compile an inventory of all the areas of land under ownership at the date of assessment. The date of assessment should be chosen to coincide with the financial year end of the organisation so the results of the assessment can be presented in the annual financial accounts.

Land which is part-owned with another organisation should also be mapped as part of this process, and the ownership arrangements recorded (biodiversity impacts are allocated to organisations in proportion to ownership). Land acquired or sold during the year should also be assessed at the date of transaction to ensure impacts are accounted for (discussed in Jarrett 2012).

This inventory of owned land, in the form of mapped polygons can be compiled on the *Our Ecosystem* interactive mapping software.

Step 2: Eco-region information

The Normative Biodiversity Metric is partly based on the degree of pristineness of the land owned by the assessed organisation. To understand the meaning of pristineness in different ecosystems, data on eco-regions should be used - an eco-region being a large unit of land or water containing a geographically distinct assemblage of species, natural communities, and environmental conditions (Olson et al. 2001).

On the *Our Ecosystem* mapping platform a global eco-regions data layer can be used, with information compiled on the pristine habitats of each eco-region (e.g. in Amazonas, tropical rainforest is a highly pristine habitat, while in the Cerrado, savannah grassland is a highly pristine habitat).

Our Ecosystem uses an eco-regions data layer and the inventory of owned land to identify the eco-region within which each piece of owned land is in.
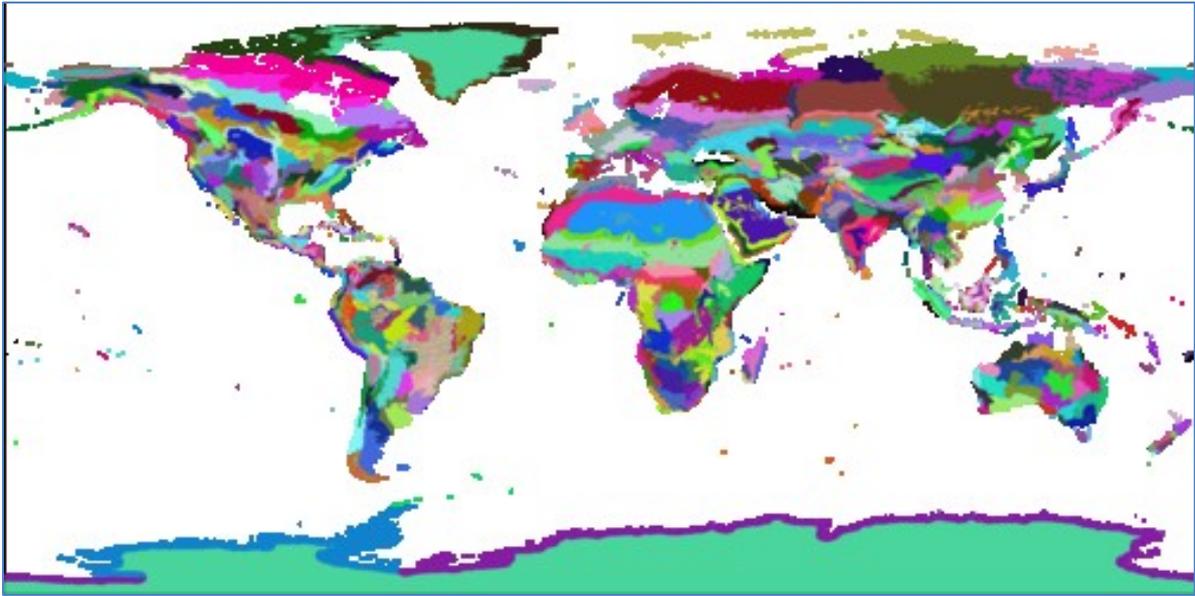
Step 3: Pristineness scale

The degree of pristineness for each piece of land is ranked on a scale of 0 – 5 in the Normative Biodiversity Metric. The scale is dependent on the eco-region; each eco-region has different types of habitat present, so slightly different scales will be used in each different eco-region.

Table 1 shows an example scale for the 'tropical rainforest' eco-region. Here, 'tropical rainforest' is identified as the pristine land cover. The class name and generic descriptors are fixed for all of the scales, the difference between scales will be in the identification of high pristine land cover types, which will be specific to each eco-region.

These different scales of pristineness for each eco-region can be accessed on the *Our Ecosystem* software.

Table 1: Pristineness classes for normative biodiversity metric assessment

<table>
<tr><th colspan="3">Tropical Rainforest Eco-Region</th></tr>
<tr><th>Class</th><th>Generic Descriptor</th><th>Land cover</th></tr>
<tr>
<td>5 – Pristine</td>
<td>Land is inaccessible and remote. Ecosystems and indigenous species virtually unaffected by human activity.</td>
<td>**Tropical rainforest**
Areas of primary rainforest where there are only small indigenous communities present. The forest is inaccessible to loggers or commercial hunters, or tourists. The indigenous communities may use forest resources, but species populations are stable.</td>
</tr>
<tr>
<td>4 – Minimal use</td>
<td>Original habitat and species distributions mostly intact; however, the area is subject to minor human impact on ecosystem functions. For example, well preserved national parks and nature reserves.</td>
<td>**Disturbed rainforest**
Areas of primary rainforest which have been impacted on in relatively minor ways by human activity. Hunting, harvesting of non-timber forest products, evidence of selective logging, or high levels of tourist activity in the area.</td>
</tr>
<tr>
<td>3 – Impacted</td>
<td>Areas which retain original land cover, but degraded such that many indigenous species are not present.</td>
<td>**Rainforest fragments**
In vicinity of roads and towns, strips of original forest remaining, but cut-off from main areas of habitat.

Degraded rainforest
Areas subject to high levels of hunting, such that many species and ecological functions are absent.</td>
</tr>
<tr>
<td>2 – Converted*</td>
<td>Areas which have been converted to a different type of land cover, but retain some diversity of vegetation. Gardens, parklands, grazing areas, low-intensive farmlands for example.</td>
<td>**Low secondary vegetation**
Secondary vegetation such as scrub, thicket, brush which occurs when the original rainforest is removed/burnt/destroyed and the soil does not recover its potential for re-growth of the rainforest.

Grazing grasslands
Former rainforest land now used for grazing. These grasslands may provide useful environmental functions such as maintaining water regimes and soil stability, but only provide habitat for generalist species.</td>
</tr>
<tr>
<td>1 – Monoculture*</td>
<td>High intensity production of one crop which causes the homogenisation of large areas of landscape, or areas of heavily manicured vegetation.</td>
<td>**Intensive agriculture**
Intensive agriculture areas, normally soybean production in the Amazon. These areas do not provide natural habitat for any species. Other monoculture plantations common in converted Amazon land include eucalyptus, sugar cane and corn.</td>
</tr>
<tr>
<td>0 – Artificial*</td>
<td>Areas which have been developed, built-up areas, or areas where no vegetation remains.</td>
<td>**Roads**
Tarmac roads which have been constructed through the rainforest.

Active mines
Open-cast mines currently in operation.</td>
</tr>
</table>

*These classes of pristineness will have many more types of man-made land covers – these are some common examples.

Step 4: Classification of assessed land

The next step is to classify the organisation's land into the NBM pristineness classes.

To classify land, it should be disaggregated into smaller parcels which are either: a) managed under a different land management strategy/used for a different purpose; or b) with different vegetation cover.

The complexity of the classification process will depend on how much information is already available, and the nature of the land owned. Satellite images from NASA's Landsat remote sensing programme with a resolution of 30m are freely available and cover the whole globe but won't necessarily be available at the date of the assessment. It is suggested that an initial assessment takes place based on Landsat images (or high resolution purchased images if desired).

There will then be a verification stage which will involve:

Surveying or gathering information on areas which were initially identified as having a high degree of pristineness, to establish whether there are any signs of hunting, resource harvesting, or degradation in the area which has negatively affected ecosystem function – if these are found the area should be considered a **minimal impact area (class 4)** – if these are not present, the area should be considered **pristine (5)**. If it is known that the area is inaccessible and there is low likelihood of human activity in the area, it should also be considered **pristine (5)**.

Surveying areas initially thought to be **impacted (3)** and **converted (2)** to establish that the initial assessment was correct. For areas to be put into the converted category the original land cover must have been removed and replaced with another land cover. An impacted area still retains the initial land cover, but human activities have significantly reduced the ecosystem function – natural areas which are isolated by urban or agricultural areas for example, or areas used recreationally.

Areas which are in the **monoculture (1)** class are areas which still have vegetative cover, but in a way which offers no replication of original ecosystem function – these may be manicured sports fields, lawns etc. These should be distinguished from low-intensive agriculture areas which should be in the **converted (2)** class.

Our Ecosystem can be used to store information on the location of each area, the pristineness classification, and any accompanying notes, which can all be accessed and used to inform the assessment process the following year.

Note on classification

Initially the aim of the NBM is to allow an organisation to measure its own biodiversity performance over time. As such, it is important that each organisation is consistent in how it applies the methodology and pristineness classes from one year to the next.

Step 5: Endangered species presence

The next stage is to assess and document the presence of endangered species on assessed land. The assessed area can be assumed to have more value for biodiversity if the area provides habitat for endangered species. The International Union for the Conservation of Nature (IUCN) red list classifications (IUCN website) should be used to define what is and isn't an endangered species – at present the endangered species adjustment should only consider mammals because the red list data is most complete for mammals.

For each endangered mammal species present within an area, the NBM score for that area will be subject to an uplift of 0.5, up to a maximum uplift of 5.

Information on which threatened, endangered, or critically endangered species are present in the area may already be available if the area has been subject to regular ecological surveys from other organisations; if this data is considered reliable it may be used to complete the NBM endangered species assessment. If such information is not available, it is recommended that the assessment first uses the IUCN red list species distribution maps to get an initial understanding of which endangered species are likely to be present within the assessed area. This data does need verification at the ground-truthing stage; the presence of these endangered species must be confirmed by ecologists that the species has been recorded in the assessed area, or that the habitat is indeed suitable for the species and is likely to be inhabited.

Where species are present within one part of the assessed area, it can be assumed that they are present within all of the assessed area which is of a similar type of habitat. Areas of **converted (2), degraded (1), or artificial land (0)** should be excluded from the endangered species uplift to the NBM. These pristineness classes are assumed not to provide suitable habitat for any endangered species, unless specific evidence of the endangered species using areas in these classes is available.

Step 6: Reporting the information

To get the organisational NBM score the average (weighted by area) of all the assessed areas should be calculated.

This The NBM assessment should be carried out annually, with the results presented in the biodiversity accounting framework shown below in table 3, the calculation of which is discussed in more detail in the paper 'Corporate Biodiversity Accounting' (Jarrett 2012).

The calculation of the total average NBM score, and the reporting process, is facilitated on the *Our Ecosystem* platform.

Biodiversity Impacts Account

	31st March 2011	31st March 2010
Habitat improvements	0.20	0.12
Habitat degradations	(0.45)	(0.30)
Overall biodiversity impact	**(0.25)**	**(0.18)**

Biodiversity Position Statement

	31st March 2011	31st March 2010
NBM assessment at start of period	**1.82**	**0**
Current period biodiversity impacts	(0.25)	(0.18)
Purchase/Sale of land	0.40	2.00
NBM assessment at period end	**1.97**	**1.82**

These biodiversity accounts can then be presented in the organisational sustainability report or the directors' report of the annual accounts.

The areas owned by the company can also be visually presented to interested stakeholders and queried on *Our Ecosystem.*

References

Jarrett, D. (2011) Organisational Biodiversity Assessment. Ecometrica publications. Available at: http://ecometrica.com/ecometrica-press/summary-papers/assessing-organisational-biodiversity-performance/

Jarrett, D. (2012) Corporate Biodiversity Accounting. Ecometrica publications. Available at: http://ecometrica.com/white-papers/corporate-biodiversity-accounting

Olsen et al. (2001) Terrestrial Eco-regions of the World: A New Map of Life on Earth. BioScience

International Union on the Conservation of Nature (IUCN) website (2012) http://www.iucnredlist.org/