Mapping High Conservation Values at large scales for effective site-level management

Public consultation draft 1, May 2009

Note on this draft discussion document

The HCV Resource Network ran a workshop in December 2008 to discuss methodologies for mapping HCVs, with an emphasis on understanding landscape-scale conservation values, and using the landscape context for effective HCV management at the site scale.

The HCV Network Secretariat has prepared this document based on the workshop debates. It is not intended as a comprehensive source document or definitive guidance. Instead, we have tried to take the debate forward in a way which will help land use managers to improve their HCV assessment and management, and to highlight a number of key issues which still need to be resolved.

We hope that this document will be read carefully by conservationists, HCV practitioners and land use managers responsible for implementing HCV management, and we would welcome suggestions for improvements, and for activities to clarify some of the key outstanding questions. Highlights in the text indicate areas where we feel a particular need for further work, but we do not intend to limit comments to these areas.

We invite comments, submissions and suggestions to be submitted by July 31st 2009.

We are deeply indebted to the workshop participants for the many excellent presentations and case studies they prepared for this workshop, most of which are available on the HCV Network website. We have liberally used these sources to illustrate and enrich our document, and intend that the final document will acknowledge the substantive contribution of all the materials used. However, any errors in this document are our own.

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Disclaimer:

The authors are responsible for the choice and presentation of the materials and opinions contained in this draft document, which are not necessarily those of the HCV Resource Network or of its Steering Group organisations.

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1. Introduction

Why is it necessary to understand HCVs at large spatial scales?

Many major natural resource sustainability standards* currently require that operations are planned and managed in a way that maintains or enhances High Conservation Values (HCVs), i.e. outstandingly significant biodiversity, social and cultural values, and ecosystem services. A basic requirement of HCV assessment (and a guiding principle of the HCV Resource Network, Box 1) is that that the identification of values should take account of the wider context.

Each management unit (MU) lies within a given 'wider landscape' containing a particular configuration of topography, vegetation, geology, land use and human settlement. This geographical context often determines whether or not a given feature of the MU is a High Conservation Value, and effective HCV management at the site level requires an appropriate understanding of the 'wider landscape' (Table 1). However, there has been little practical guidance on how to map HCVs at large 'landscape' scales or how to interpret large-scale maps for site-level decisions.

The HCV concept was originally designed to be used at the management unit level for sustainable forest management. Significant and urgent new challenges arise from the introduction of HCV as a tool for planning where large areas are zoned for conversion of natural vegetation to tree plantations or agricultural crops. This is especially challenging where government land use plans do not incorporate a systematic conservation approach.

If land use plans do not take conservation needs into account, individual MUs may be assessing HCVs and planning HCV management without the benefit of a coordinated large-scale approach. This creates a clear risk that case by case HCV assessments, using inconsistent methodologies, will result in conflicting maps and management recommendations. This will lead to confusion, poor implementation, and damage to conservation values, thus devaluing the HCV concept.

In order to minimise these risks, forest managers, plantation owners and other key stakeholders (certification bodies, investors, supply chain organisations, social and environmental NGOs, government planning offices and others) urgently need:

- shared maps and consistent information and guidance on HCVs at large spatial scales (e.g.regional or landscape level),
- guidance on what these maps mean at the site or project level, and
- tools for conservation planning/management at the site level if HCVs are present.

* E.g. Forest Stewardship Council (FSC), Round Table on Sustainable Palm Oil (RSPO), Round Table on Responsible Soil (RTRS), UK Renewable Transport Fuel Obligation (RTFO), Round Table on Sustainable Biofuels (RSB), and Climate Community and Biodiversity Alliance CCBA.

Table 1. The 6 generic HCVs (from the 'Global' HCVF Toolkit, 2003[1]) and the importance of the landscape context for HCV identification and management.

High Conservation Value		Importance of the landscape context for identification and management		
		High	Med.	Low
HCV 1: Areas containing globally, regionally or nationally significant concentrations of biodiversity values	HCV 1.1 Protected areas	X		
	HCV 1.2 Rare, threatened or endangered species	X		
	HCV 1.3 Endemic species	X		
	HCV 1.4 Critical temporal use			X
HCV 2: Globally, regionally or nationally significant large landscape-level areas where viable populations of most if not all naturally occurring species exist in natural patterns of distribution and abundance	No sub-criteria	X		
HCV 3: Areas that are in or contain rare, threatened or endangered ecosystems	No sub-criteria	X		
HCV 4: Areas that provide basic ecosystem services in critical situations	HCV 4.1 forest or ecosystems critical to water catchments		X	
	HCV 4.2 Forests or ecosystems critical to erosion control			X
	HCV 4.3: forests or ecosystems providing barriers to destructive fire		X	
HCV 5: Natural Areas fundamental to meeting basic needs of local communities	No sub-criteria		X	
HCV 6: Natural areas critical to local communities' traditional cultural identity	No sub-criteria			X

What is the purpose of this document?

This draft discussion document is the result of a workshop organised by the HCV Resource Network in December 2008 (see Section 2) to examine interpretation and mapping of HCVs at a range of spatial scales, and in particular to link very large or 'landscape'-scale conservation priorities with site-level HCV management.

The aims of this document are:

- *To promote a constructive debate amongst HCV stakeholders on HCV mapping*
- *To develop shared, knowledge based and participatory HCV mapping tools to guide consistent HCV mapping,*
- *To promote efforts to integrate HCV in land use planning frameworks*

This document is likely to be useful for anyone involved in HCV assessment and management for **large scale or high impact operations** (defined in Annex 2), particularly in situations where data is deficient, where national strategic conservation planning assessments have not taken place, or where such an assessment has not been integrated into the national land use planning framework. Because of the relative importance of the landscape context for biological values (see Table 1 and section 4.1), this document emphasises the biodiversity elements of HCV assessment, but the HCV Network and the workshop participants recognise that social elements are equally important and that further development of social concepts and methodologies with HCV assessment is an urgent necessity.

This document assumes some familiarity with HCV concepts, the HCV assessment process and site-level methodologies. Further HCV briefing notes and guidance documents can be sourced from the HCV Network website, www.hcvnetwork.org.

How much effort will be required for understanding the landscape context?

Social and environmental impacts of plantations and forestry operations are usually lowest where they are part of a planned landscape in which social, production and conservation needs are balanced and zoned appropriately. Landscape HCV assessment in such a context may be a relatively simple task, if the baseline data and guidance are widely available. The level of effort which is necessary also depends on the intended land use and potential impact within the management unit:

- Small to medium-scale, low-impact operations are likely to require a relatively local, low-tech or qualitative analysis of the wider context. Appropriate guidance at this scale needs to be kept as simple as possible, and context analysis should require a minimal burden on managers' resources and time.
- Large-scale, high or very high-impact operations are likely to need a larger frame of reference, access to high-quality data (e.g. up-to-date satellite images or aerial photography) and detailed quantitative analysis. This document provides guidance on many of the key issues that will need to be addressed.

Guidance on the categories of impact of various types of operations has been developed by the HCV Network Technical Panel for assessing HCV assessments

(three categories of impact, Annex 2). It is unlikely that conservation management for any Category 1 operations and some Category 2 operations as defined in Annex 2 would be credible or effective without some rigorous analysis of HCVs at the landscape context as suggested in this document.

Box 1: Guiding Principles of the HCV Resource Network

(NB: The HCV Resource Network Charter text (see www.hcvnetwork.org) has been slightly abridged and highlighted to indicate key points discussed in the workshop of December 2008.

High Conservation Value areas are **critical areas in a landscape** which need to be appropriately managed in order to maintain or enhance High Conservation Values (HCVs). There are six main types of HCV area (...):

HCV 1 Areas containing globally, regionally or nationally significant concentrations of biodiversity values (e.g. endemism, endangered species, refugia).

HCV 2 Globally, regionally or nationally significant large landscape-level areas where viable populations of most if not all naturally occurring species exist in natural patterns of distribution and abundance.

HCV 3 Areas that are in or contain rare, threatened or endangered ecosystems.

HCV 4 Areas that provide basic ecosystem services in critical situations (e.g. watershed protection, erosion control).

HCV 5 Areas fundamental to meeting basic needs of local communities (e.g. subsistence, health).

HCV 6 Areas critical to local communities' traditional cultural identity (areas of cultural, ecological, economic or religious significance identified in cooperation with such local communities).

The HCV approach (...) should always involve:

- **Assessment of the presence or absence of all six HCVs**
- **Analysis of the context** including existing protection of, and threats to, the identified HCVs.
- **Identification of the location and relevant management regimes for the HCV areas** required to maintain or enhance the identified HCVs.
- Development and implementation of a monitoring programme (...).

The assessment process to be followed should be:

- **Knowledge-based, incorporating and using all relevant scientific data and local knowledge**. Where significant gaps in existing information are identified, data should be collected or the precautionary approach, commensurate with the degree of risk, should be followed.
- **Participatory and inclusive,** ensuring that relevant stakeholders are consulted and their views or the information they provide is incorporated into the process and that **appropriate existing initiatives are engaged wherever possible.**
- Open and transparent including peer reviews of findings and public reporting of outcomes.

2. HCV Resource Network mapping methodologies workshop

In December 2008 the HCV Resource Network convened a workshop of international HCV assessment experts, conservation biologists and other stakeholders (see Appendix 1) to share their experience and discuss:

- The technical basis and range of appropriate methodologies for mapping HCVs at a large 'landscape' or regional level with a particular emphasis on the landscape context (Box 2) for biodiversity management.
- Incorporation of large-scale conservation priorities into site-level assessment and planning decisions, consistent with sound principles of conservation science,
- Strengthening the links between HCV management plans developed by industry, and existing conservation initiatives, such as national conservation strategies, land use planning frameworks, and NGO-led conservation projects.

Box 2: Note on the meaning of 'landscape'

There have been many attempts to define what we mean by a 'landscape', which is not an exact scientific term but rather a flexible way of defining a large land area with some defining or coherent characteristics. Landscapes can be understood to be mosaics of different types of habitats or ecosystems, defined by human conceptions and values, at a scale where different land uses can be balanced.

'Conservation landscapes', as understood by conservation biologists, may be defined in terms of maintaining viable populations of species, or defined species assemblages, and may contain or overlap with a series of 'cultural landscapes' as understood by communities and social groups. There is no single way of defining landscapes, as this depends on what the purpose of the assessment is.

We use the phrase 'wider landscape' as a convenient shorthand for conveying the large-scale context for HCV assessment, but remain aware that the ‘landscape’ concept means different things in different places according to biological, geographical, political, economic and social factors.

In drafting this document, we recognise that the input of conservation biologists is just one of several important components of the wider HCV identification and management process. Unlike many biodiversity values, social values cannot be reliably identified at a landscape or regional level (see Box 3 and Table 1). For site level identification and management of HCVs (including social and biological values), local people and community representatives need to be directly involved in the assessment process, and land use industry representatives have a vital role to play in the development of design tools and management methodologies for economically viable and sustainable forestry and plantation activities. It is hoped that this document will stimulate debate amongst HCV stakeholders including community and industry representatives as to how to integrate all of these strands of HCV management.

3. Outline of HCV mapping process

In existing sustainability standards and HCV toolkits, HCV areas have been defined in two different ways:

Definition 1: HCV forests (or areas) are areas which possess one or more HCV attributes. This definition describes a spatial boundary for the occurrence of one or more HCVs.

Definition 2: HCV areas are critical areas in a landscape which need to be managed appropriately to maintain or enhance one or more HCVs. This definition describes a spatial boundary for the area where specific management is required.

The second definition can be more explicitly described as an HCV management area (an approach that has been adopted e.g. by the Indonesian HCV Toolkit revision of 2008[2]).

Effective management of HCVs at the site level normally requires maps and/or descriptions of HCV occurrence (definition 1), leading to maps of HCV management areas (definition 2).

The HCV mapping process can be achieved by a number of separate but linked steps:

1. Deciding on the spatial extent of HCV assessment (i.e. how big is the 'wider landscape' within which HCV judgements are made? See section 4).
2. Large-scale identification and coarse mapping of potential HCVs within this 'wider landscape' (see Sections 5 and 6)
3. Site level investigation and detailed mapping of HCVs, including:
   - **a)** ground-truthing and detailed site-level mapping of values identified through the large-scale mapping process,
   - **b)** identification and detailed mapping of HCVs which are not apparent at large scales.
4. Conservation target setting and mapping of HCV management areas (areas which must be managed to maintain or enhance HCVs) (see Section 7).

This document covers some of the key issues associated with these steps. For further information on site-level assessments (specifically step 3), see also the 'Good Practice Guidelines for HCV assessment' (2008)[3] in particular.

4. How big should the 'wider landscape' be?

Purpose of analysis: To define the boundaries of the 'wider landscape' at a scale which is appropriate for deciding whether the features of the MU are HCVs.

4.1. Usefulness of landscape-level analysis for different HCVs

The boundaries of the assessment landscape are particularly important for defining biological HCVs, and in particular for HCV 3 analysis, because thresholds of significance (such as rarity and threat levels) for species and ecosystems are relative and scale-dependent (see Table 1).

In contrast, an individual human community's critical needs or cultural values are not relative in the same way: they cannot be considered less significant if there are lots of other examples of similar values being preserved in a wider context. Social and cultural HCVs tend to be more localised and thresholds of significance can generally only be determined by a bottom-up approach, including community-by-community consultation.

Mapping and analysing the 'wider landscape' therefore has different implications and different uses for different HCVs (Box 3). In each case the analysis provides a preliminary identification of potential values, which will often need more detailed analysis at the Management Unit level.

Social and cultural landscape concepts:

Much of this document concerns decision processes for assessing biological HCVs. Conservation biologists are used to defining land units based on remote sensing data, ecological parameters such as vegetation, climate, soil and elevation, and the habitat requirements and population characteristics of key species.

Human communities often have very different perceptions of what landscapes mean – based e.g. on ethnicity, religion and language, economic and cultural exchanges with other communities, social history, and other characteristics.

Understanding the social and cultural context at a local level is critical not only for maintaining HCVs 5 and 6, but also for effectively conserving biological HCVs. To what extent, and how, do we need to understand or map social landscapes for HCV management? Does the concept of social landscapes help us to understand social HCVs, or to maintain and enhance social and cultural values? Does it help us to maintain or enhance biological values?

Who and how do we need to consult in order to get a better understanding of these issues, and to understand the interaction between social and biological values?

Box 3 Some uses of the wider 'landscape' analysis for different values

Context for HCV 1 analysis

- Position, extent and condition of protected areas relative to the management unit
- Position, extent and condition of suitable habitat (where suitability is known) for rare, threatened and endangered species
- Existence of (large-scale) features which may support temporal concentrations of biodiversity (e.g. mud flats, wetlands)

Context for HCV 2 analysis

- Existence of large, relatively intact ecosystems and their degree of fragmentation/disturbance
- Potential for large-scale ecological functionality within the landscape

Context for HCV 3 analysis

- Identifying and categorising the range of different ecosystems present (see also following section)
- Assessing which ecosystems are rare, and what the level of threat is (e.g. current and predicted future loss) to different categories of ecosystems

Context for HCV 4 analysis

- Existence of potential ecosystem services provided e.g. by rivers and natural vegetation on slopes
- Presence of communities and sensitive ecosystems that may be affected by Management Unit operations (e.g. downstream communities)
- Large-scale environmental risks potentially affecting the management unit

Context for HCV 5 and HCV 6 analysis:

- Large scale patterns of land use, settlements, roads and other infrastructure
- Configuration and proximity of natural ecosystems to known settlements

Context for management decision-making:

- At the management decision stage, the landscape-level analysis provides a basis for linking conservation measures within the MU to larger scale processes (see section 7)

4.2. Getting the scale right:

Drawing boundaries in different ways may alter the decision to classify a value as HCV or not.

- If the boundaries of the landscape are drawn too small, many values within it may be represented by a very few, poorly protected examples and be incorrectly considered rare or threatened, when in fact they may be common and well protected outside those boundaries.

- If the boundaries are too large, the logical basis of the analysis may be lost. Errors will be made by not comparing like with like, e.g. incorrectly lumping together dissimilar habitats or ecosystems, and therefore failing to detect that some are truly rare/threatened. The data may also be too coarse for good decision making.

Defining boundaries of the 'wider landscape'

Conservation of threatened biodiversity values depends largely on the conservation of natural ecosystems, including preserving sufficient suitable habitat for threatened or endangered species (HCV 1) and preserving HCV 3 (rare or threatened ecosystems). In many cases, assessment of biological HCVs should begin with ecosystem analysis, based on a large-scale analysis of the vegetation types present (see following section).

Ecosystems are hierarchical i.e. they can be defined at a range of scales from micro-habitats to biomes. Therefore, defining landscape boundaries is the top level of a hierarchical process (illustrated in Fig 1):

- At a very large scale, a country or region can be subdivided into the major physical and climatic units which govern ecosystem formation.
- The major subdivisions may need to be broken down into more manageable units which encompass a consistent set of ecosystems and physical features such as mountain ranges, watersheds and rivers.
- The ecosystem units making up the 'wider landscape' should themselves be defined so that they are relevant to the scale of the management unit, and can be used for site-level planning (see Section 5).

Assessors undertaking this type of analysis for understanding the biodiversity-related HCVs (HCVs 1, 2, 3) should be guided as far as possible by an existing national conservation framework. The ideal option is to follow a widely accepted scheme of *biogeographic divisions*, i.e. large areas characterised by repeating patterns of ecosystems with common biological characteristics, which differ substantially from neighbouring regions. These should be the upper scale limit of any HCV analysis.

In most countries suitable analyses have been conducted of biogeographical zones for the purposes of protected area selection or agricultural production, which can serve as the basis for selecting 'landscape' boundaries. There may be major geographical barriers between biogeographic regions (e.g. mountains or large rivers); in other cases, change is gradual and boundaries are based on expert consensus.

Other potential boundaries include political or administrative units – e.g. provincial or district boundaries. This is the level at which land-use planning decisions are made so the findings of the landscape analysis may need to be communicated using these boundaries. However, if large-scale biogeographic patterns are very different

from political boundaries, the analysis may need to cross political boundaries (see Figure 2).

Whatever the scheme used, this needs to be justified and the assumptions that are made by choosing a particular method should be explained.

EXAMPLES of helpful classification schemes

XX Need to compile a credibly complete regional lists of biogeographical classifications through HCV Network expertise XX

Government-led ecological land classification schemes:

- Physiographic Regions system adopted in the Indonesian HCV Toolkit (see Fig 1)
- Bailey's ecoregions of the United States (US Forest Service)[4] and the Commission for Environmental Cooperation's Ecoregions of North America[5]
- Ecological Land Classification of Canada[6]
- European Environment Agency's Biogeographical Regions of Europe 2008 (these are extremely broad – of limited use?)[7]

NGO-led programmes:

WWF's ecoregions and their national subdivisions – XXX NB where are these done to a suitable level of accuracy for HCV work? XXX.

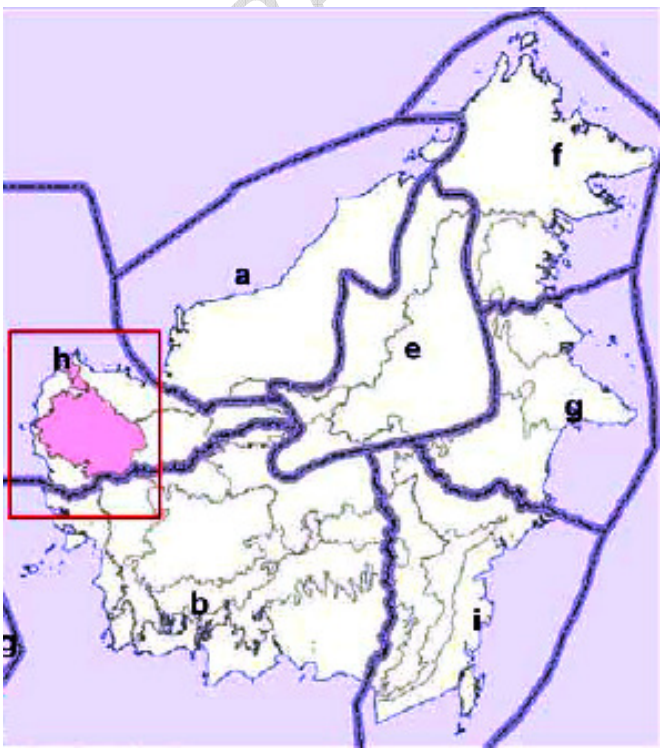

Fig 1: Biogeographic subdivisions of the island of Borneo, showing major subdivisions (Biounits a-I of Mackinnon 1996) and smaller Physiographic Regions (e.g. Western Plains and Mountains, highlighted in pink) based on the Indonesian Government's land classification study ('RePPPRoT').

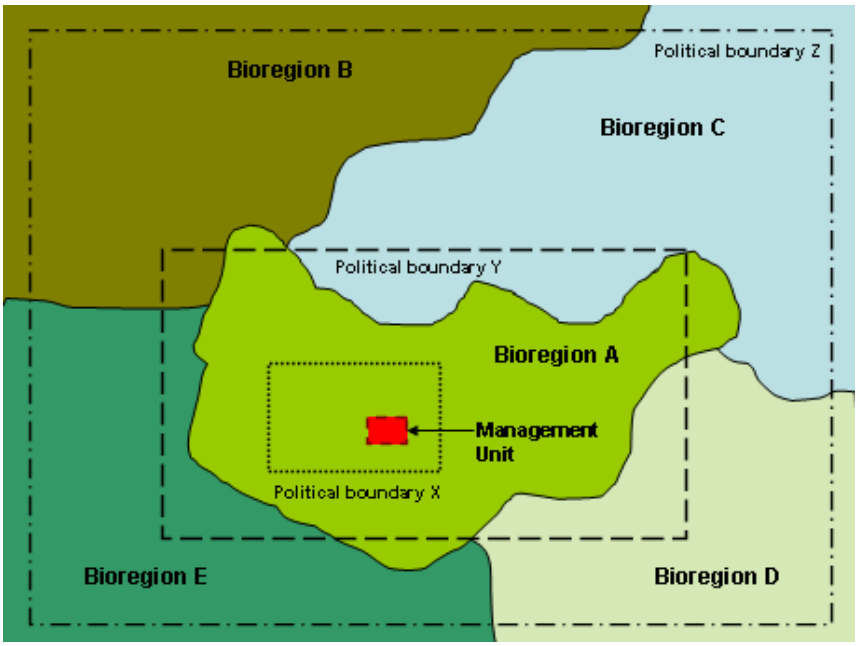

Figure 2: Deciding on appropriate limits for the 'wider landscape': the ideal scientific context for an ecosystem analysis centred on the Management Unit is 'Bioregion A' (itself made up of a repeating pattern of ecosystem units, not shown). If a political boundary is chosen for practical purposes, this should broadly coincide with the ecological reality e.g. political boundary 'X' is too small, 'Y' is the right order of scale, 'Z' is too large.

5. Identification and large scale mapping of biological and ecological HCVs (HCV 1, 2, 3)

Starting with the range of existing data, assessors need to decide what is significant or critical at a regional, national or global level (i.e. what is HCV) and use these criteria to map HCVs.

For biodiversity values (HCV 1, 2, 3), in the absence of detailed and up to date species distribution data, a sensible approach is to start with the identification of HCV 3 (ecosystems) and then identify gaps relating to species-specific conservation targets (HCV 1). This is the approach followed in this document. However, this is for guidance only and there may be circumstances where it makes sense to look at HCV species and their critical needs first (especially if ecosystem data is poor or does not correlate well with known HCV 1 species distributions).

Does the document's structure help or hinder understanding the approach to landscape level HCVs?

5.1. Mapping HCV 3 at large scales:

HCV 3: *Areas that are in or contain rare, threatened or endangered ecosystems.*

Purpose of analysis:

- To identify which ecosystems exist within the 'wider landscape' containing the management unit (see Box 4 for ecosystem definition for HCV management),
- To identify which ecosystems are under critical threat,
- To identify which ecosystems are potentially present in the management unit.

Output:

Indicative maps of HCV 3 in the wider landscape, providing context for Management Unit-level assessment.

Suggested process for HCV 3 mapping:

- Map existing ecosystem diversity (e.g. maps of vegetation classifications based on best available evidence (Fig 3))
- Map current land cover & remaining natural ecosystems (Fig 3 and 4)
- Measure actual threats to ecosystems (e.g. calculate actual loss of extent based on a known historical extent and current distribution of ecosystems)*
- Estimate potential future threats to ecosystems (e.g. calculating potential/probable loss of extent based on current land use plans and trends)

* NB: Assessing HCV 3 requires maps of protected areas, which are dealt with under HCV 1.1.

- Apply rarity and threat selection criteria (see Box 5)
- Produce indicative, large scale HCV 3 ecosystem maps and information

Box 4 Defining ecosystems for HCV 3 analysis

For mapping HCV 3, a definition of ecosystems needs to be chosen at a relevant scale for decisions in forest or plantation management. The criteria used for defining ecosystems are likely to vary according to the location, level of knowledge, and the scale of normal operations in a region.

The Convention on Biological Diversity (CBD) defines an ecosystem as a "dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit". This definition highlights the fact that ecosystems can be defined at a range of scales from the micro scale (e.g. a puddle, a rotting log) to the macro scale (e.g. the Amazon Basin). Neither of these extremes is useful for managing HCV ecosystems in forestry or plantations.

A practical and widespread approach is to base the ecosystem definition on **vegetation classifications** which are easily recognizable in the field as well as on satellite images. This sets the ecosystem definition at the scale of **relatively homogeneous natural (or traditionally managed) vegetational units with distinct structural or functional attributes**, which are defined by an interaction of biotic factors (e.g. species composition) and abiotic factors (e.g. soil, altitude, rainfall etc.).

How this is applied in practice is dependent on the available data and local knowledge or understanding. Where little is known about the species composition of ecosystems, several biophysical factors can be combined to give suitable proxies for vegetational units e.g.:

- Land cover type (forest, grassland, wetland etc)
- Rainfall and temperature
- Altitude and slope
- Geology and soils
- Hydrology

Many countries or have developed vegetational classifications which are useful at the scale of HCV identification and planning e.g.:

- The modified RePPPRoT land classification system used in Indonesia
- Ecosystems of Central America (interactive mapping resource, Vreugdenhil et al 2002 and World Bank) and updated national maps
- Provincial-level ecological land classifications of Canada (see Canadian Forest Service)
- European Environment Agency: European Forest Types[8] and EU Habitats Directive definition of European Union Habitats[9]
- OTHERS ?

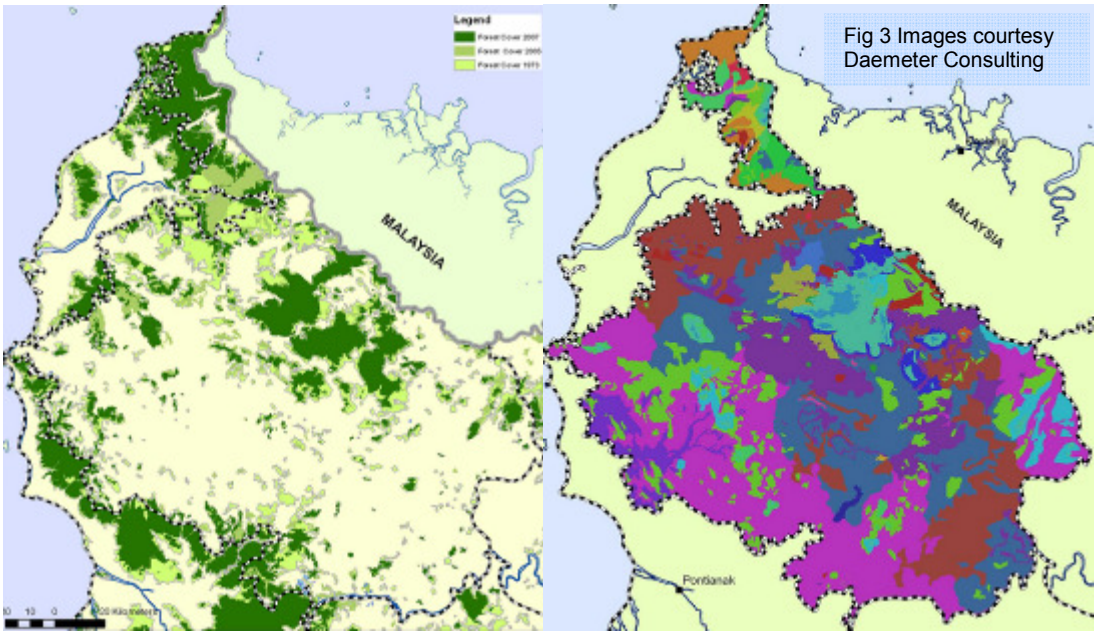

Fig 3: Key data for HCV 3 mapping in the Western Plains and Mountains of West Kalimantan, Indonesia (the area highlighted in pink in Fig 1). Left, Forest cover: *Past (earliest Landsat images, 1973);* – light and medium green. *Present (2008)* – dark green. (For projected future cover, see Fig 4). Right, the region's ecosystems mapped following the government's RePPProt classification, modified for the Indonesian Toolkit.

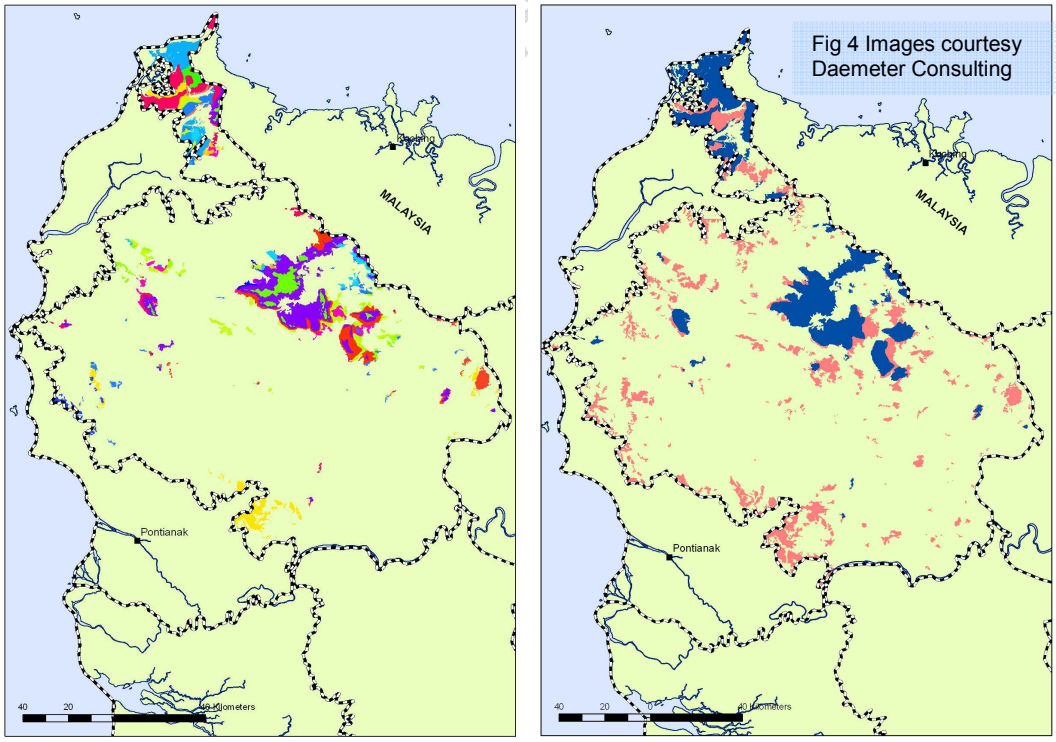

Fig 4: Current ecosystem cover (not shown) and projected future ecosystem cover (left) are compared for each ecosystem class against historical data. Ecosystems which have lost >50% of cover or are projected to lose >75% of cover are HCV 3 (Pink areas, right). In this region, almost all of the remaining lowland forest ecosystems are HCV 3.

Box 5 Possible criteria for identifying HCV 3 ecosystems

- **Pre-existing definitions of priority ecosystems:** explicit identification and descriptions of endangered ecosystems in an existing, nationally or regionally supported priority list/map.
- **HCV3 rarity criteria:** irrespective of threats or losses, HCV classification based on an agreed critical threshold of extent (e.g. ecosystems constituting < 5% of remaining natural vegetation are considered rare in the Indonesian National HCV toolkit).
- **HCV 3 threat criteria:** A range of possible criteria may be used for defining endangered ecosystems including:

  - Actual, area-based loss of cover against an agreed baseline, with critical thresholds set by % losses (e.g. 70% loss against pre-industrial extent)

  - Actual extent being less than a given representational target (e.g. one set by a systematic conservation plan – see Box 6)

  - Combination of rarity/threat, quality of remaining examples, and existing levels of protection within protected area network: a) quantitative measures or b) qualitative e.g. a simple matrix of habitat vs. protection levels.

  - Trend for rapid loss in recent years (e.g. 10 years)

  - OTHER

Notes on the decision process for HCV 3 identification:

Factors which tend to raise the importance of individual ecosystems and make them more likely to be considered HCV 3 include:

- Poor or partial representation within protected areas in the 'wider landscape'
- Representation within ineffectively managed protected areas ('paper parks') i.e. where habitat loss is continuing
- High degree of fragmentation relative to original extent
- Uniqueness or low replication in the landscape (i.e. ecosystem is known from one or a very few examples)
- Known land development plans threatening future large losses

Frequently asked questions on HCV 3 mapping:

Is the aim to provide a definitive map at this stage?

The aim at this stage is to provide an indicative map of potential HCVs. The resolution available for large-scale mapping is usually too coarse for site level planning. Once you know what the critical ecosystems are within the wider landscape, these can be mapped more accurately within the management unit.

How accurate does the landscape mapping of an HCV 3 ecosystem need to be?

The scale for such mapping should ideally be 1:250,000 or better (resolution of 125m). A scale of 1:20,000 (10m resolution) or better is more appropriate for management unit planning (Mapping should have sufficient accuracy that ecosystem boundaries can be recognised at the scale of the management unit).

How should we deal with highly fragmented examples of a threatened ecosystem at the mapping stage? Can we eliminate non-viable fragments e.g. below a minimum size threshold?

All identified fragments of HCV 3 ecosystems should be mapped. Ecosystem viability or functionality should be considered at the management stage, and management prescriptions for fragmented ecosystems fragments will be context dependent (see section 7).

Can we directly use existing bioregional conservation plans, and if so, what are the minimum quality requirements?

Many countries have conducted formal systematic conservation assessments (see Box 6) either to design protected area networks from scratch, or to complement existing national parks with additional reserves and other conservation measures. Building on bioregional conservation plans is highly encouraged, where these plans remain up to date and relevant. It is important to use plans that deliver detailed recommendations at the right sort of scale (see section 4) and have widespread support from national institutions, and to integrate biodiversity recommendations generated by such plans with community engagement processes.

How do you proceed in the absence of comprehensive supporting data or a recognized national process?

Regional systematic conservation assessments are usually beyond the scope of land management companies acting alone. However, it is important to remember that whatever assessment is carried out, it must provide a robust justification for why a given feature has, or has not been considered HCV. This must be done with relevance to the landscape context as described here. By using up to date maps and current knowledge, consulting widely on outputs and management plans, and employing a precautionary approach, it is possible to ensure that HCVs are managed effectively within land management units.

Box 6 Links between HCV management and national conservation strategies

National parks, wildlife reserves and other protected areas are principal tools for implementing national biodiversity conservation strategies. In theory, protected area networks should be designed using a systematic conservation assessment process. Conservation assessment (also called systematic conservation planning - SCP) is the scientific discipline of selecting reserves in such a way that they represent or sample the full variety of biodiversity (the principle of representativeness), and ensure the long-term survival of species (the principle of persistence) by maintaining natural processes and viable populations and by excluding threats. There is a large scientific literature on conservation assessment, some of which may be very useful for land use planners and HCV assessment teams.

Protected area networks in fact were often planned in an ad-hoc way and often do not adequately protect the full range of species and ecosystems, which is one reason that sustainability standards require HCVs to be maintained within production areas. The purpose of the HCV process is not to set up protected areas (although set-asides are an important part of many HCV management plans); however, identifying and managing HCVs at the Management Unit with due regard for the basic principles of conservation planning can allow industry to contribute to provincial or national conservation ambitions, in a way that complements the national protected area network.

5.2. Mapping HCV 1 at large scales

HCV 1: *Areas containing globally, regionally or nationally significant concentrations of biodiversity values (e.g. endemism, endangered species, refugia)*

Purpose of analysis:

- To identify which areas potentially support 'concentrations of biodiversity values'.
- To assess which species are not adequately protected by maintaining HCV 3 (rare/threatened ecosystems)
- To identify key additional sites which need to be managed to preserve these biodiversity values

Output:

Maps and supporting descriptions of suitable habitat for significant biodiversity values not captured by HCV 3 ecosystem analysis.

Suggested process for HCV1 mapping:

- Map concentrations of biodiversity (HCV 1.2, 1.3, 1.4 – see below)
- Overlay HCV3 (ecosystems) and protected areas (HCV 1.1)
- Gap analysis for area-based species conservation priorities.

Sections below deal with HCV 1 mapping, numbered as in the HCV Toolkits.

5.2.1. Mapping HCV 1.1 - Protected areas

Process: Mapping of Protected Area boundaries should be relatively straightforward; consideration should also be given to mapping legally mandated buffer zones (where certain activities are prohibited).

Protected areas include any area designated by national or international law primarily for conservation; categories of protected areas are normally listed in national interpretations of HCV toolkits.

5.2.2. Mapping HCV 1.2 - Threatened and endangered species, and HCV 1.3 - Endemic species:

The aim of mapping at the large scale should be to identify areas of habitat which could potentially support individuals or populations of HCV species, or which are potentially required for a part of wide-ranging species' lifecycle.

It is important to remember that HCV 1 is concerned with **significant concentrations of biodiversity.** In some cases this may mean the presence of a single, nationally iconic species (see Figure 5), but in most cases it means areas where there are several or many rare or threatened species. Most Toolkits give some guidance as to how to interpret 'concentrations'; in practice, mapping HCV 1.2 and

1.3 results in a habitat prioritisation exercise (usually highlighting areas where RTE species distributions overlap), supported by a reasoned argument for the prioritisation process (see Box 7).

Most HCV Toolkits consider that rare, threatened or endangered (RTE) species are those which are listed as Vulnerable, Endangered or Critical on the IUCN international or regional Red Lists, or which are protected under national law. Some toolkits (e.g. Indonesia) consider Critically Endangered species separately from Endangered or endemic species. The majority of rare or endangered species are associated with rare or threatened ecosystems (HCV 3), and protecting these will normally protect most HCV 1 species. Exceptions are mentioned below.

If habitats suitable for concentrations of biodiversity are thought to be present within the Management Unit, these areas of habitat will need to be ground-truthed at the site level.

Suggested process for mapping HCV 1.2 and HCV 1.3:

- Map known locations/distributions of a selection of well known endangered species (e.g. umbrella species and iconic species), and endemic species of restricted range.
- Map land cover and existing areas of natural vegetation (as for HCV 3)
- Identify suitable habitat for key species of concern, as far as is known
- Apply prioritisation criteria (see box 7)
- Produce indicative, large scale maps of habitat supporting HCV 1 species.

In practice, species distribution data may not be sufficient to map or prioritise potential HCV 1 habitat with any real accuracy. In that case, a reasonable proxy would be to do it through expert discussion, supported by appropriate existing initiatives e.g.:

- pre-defined site selection criteria (e.g. AZE sites, Important Bird Areas, Important Plant Areas, Key Biodiversity Areas... other useful schemes?)
- Work of regional conservation priority setting workshops

It is important to note that mapping RTE species distributions and potential HCV 1 habitats is NOT the same as identifying the area needed to maintain or enhance that value. For that you need to set conservation targets to support viable populations (see section 7).

Box 7: Possible criteria for identifying 'concentrations of biodiversity' (HCV 1.2, 1.3):

Numerical criticality thresholds as per National HCV Toolkits – e.g.:

- Presence of one or more individuals of IUCN red list critical (CR) species
- Presence of X nationally protected, red-listed or endemic species
- Presence of Y% or more of the nationally red-listed forest-dependent primates

Habitat types/features specifically identified in National HCV Toolkits

Area-based population viability criteria (combined with the above):

- How do we apply this in practice?

Habitat threat criteria as per HCV 3 analysis e.g.:

- Current area-based % habitat losses relative to a defined baseline
- Potential future % habitat losses based on land use plans and/or current trends

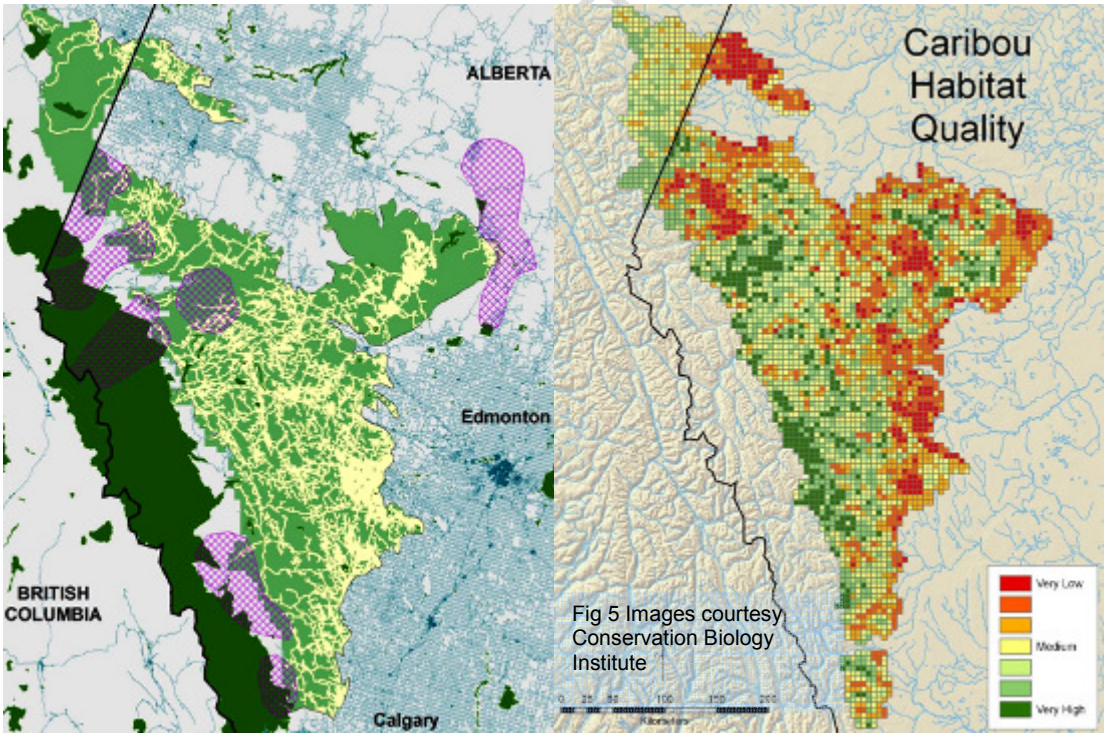

Fig 5: Woodland Caribou distribution and habitat quality in the Western Alberta Upland Ecoregion. Canada's forest-dwelling woodland caribou are classed as threatened under the federal Species At Risk Act (SARA). This emblematic species depends on intact forested ecosystems and is a key indicator of the health of Canada's boreal forest. Distribution of caribou herds (cross-hatched area, left) is overlain with suitable habitat indicators (right), to inform decisions on areas suitable to support viable populations (see also section 7).

HCV 1 species requiring specific additional analysis

There are two broad types of HCV 1 species which may not be adequately be protected by maintaining threatened ecosystems (HCV 3), and which may therefore need additional management:

Wide ranging-species with broad habitat requirements

Some species (such as many large carnivores) roam over large areas and can utilize or travel through many types of habitat including good quality or degraded natural vegetation, plantations, and agricultural areas. Threats to these species may come from other sources than habitat loss (e.g. hunting and poaching, egg collection). Some of these species do have certain habitat requirements for part of their life-cycle (e.g. undisturbed areas required to breed successfully, or particular preferred hunting grounds).

Where such species are likely to occur, their presence should be indicated across the whole area, and critical habitat e.g. feeding or breeding should be mapped. It is likely that such species will require other conservation measures for their continued survival e.g. community-based management or initiatives to reduce hunting pressure.

Species requiring habitats that are too localized to be detected at the landscape level:

This category may include e.g. endemic species, occurring in habitats of very restricted extent. Habitat suitable to support populations of such species should be assessed at the site level.

5.2.3. Mapping HCV 1.4 - Critical temporal use

Many species congregate in specific resting or feeding areas either on a daily basis (e.g. roosting caves for bats), on a regular, seasonal or annual basis (e.g. wetlands and other key feeding areas for migrating birds, salt licks for elephants), or at irregular intervals (unpredictable but vital fruiting trees and groves for many primates in tropical rainforest). Migration routes and wetlands are usually well-known and can be mapped at large scales, but other key areas such as bat caves or keystone fruiting trees should be identified though expert input, local consultation and/or traditional knowledge, and mapped at the site level.

5.3. Mapping HCV 2

> ***HCV 2:*** *Globally, regionally or nationally significant large landscape-level areas where viable populations of most if not all naturally occurring species exist in natural patterns of distribution and abundance.*

HCV 2 is the *only* HCV that is defined as a landscape level value in itself. Guidelines on identifying/mapping HCV 2 have been given in the original HCV Toolkit (2003) and the 'Good Practice Guidelines for practitioners and assessors' (2008).

Feedback from the HCV Resource Network members is needed to clarify the application the HCV 2 concept for effective conservation management. Clearly, large landscape level *forests* are amongst the most important, relatively undisturbed natural ecosystems on the planet. However, there is some debate about how to use the HCV 2 concept within sustainable forest management/land use planning, as it remains unclear whether its function is to protect:

- wilderness 'intactness' values (are these strictly speaking social rather than biological values?),
- large scale functionality of vast natural ecosystems, or
- sensitive and wide ranging species (should this be handled under HCV 1)?

There is also an ongoing debate about what management operations are compatible with HCV2. Several conservation groups advocate no operations whatsoever in large, landscape forests. In some tropical forests, it has been argued that well managed, low impact logging combined with good hunting controls are compatible with maintaining HCV2 values. In many boreal forests, where clear-felling over areas of many hectares is the norm, there are valid arguments for strong restrictions on logging operations in HCV 2 forests, but some have argued that operations mimicking the large scale natural disturbance regime (e.g. large fires) of boreal forests are in fact compatible with this value.

HCV 2 has sometimes been used within HCV assessments as a "pigeonhole" for a landscape-level assessment. In this context, it does serve an extremely useful purpose i.e. it obliges the assessor to consider the wider landscape. However, the approach argued here is that a landscape analysis underpins all the detailed HCV assessments.

Within a forest management context, has the identification of HCV 2 been used effectively to reduce the impact of logging operations and forest fragmentation effects?

If HCV 2 is intended to protect ecosystems which are undisturbed by human beings, does the concept make sense outside of forest ecosystems? For example, many large ecosystems such as highly biodiverse grasslands have been moulded by centuries or millennia of human intervention, including fire-setting.

Has the practical application of the HCV 2 concept by land use managers yielded good examples of actual conservation benefits, which would not have occurred otherwise or been covered by the other HCV categories?

Is it likely that this concept will yield actual conservation benefits if it is applied in areas which have been zoned for conversion to plantations, rather than that of sustainable forest management?

6. Identification and large scale mapping of social HCVs (HCV 4, 5, 6: ecosystem services, social and cultural values)

Recognising that much of the mapping for social/cultural HCV management, especially HCVs 5 and 6, **must** be done at the site level through participatory processes, this section considers what elements of social HCVs have a landscape component or can be mapped usefully at a landscape level.

6.1. Mapping HCV 4 at large scales

HCV 4: *Areas that provide basic ecosystem services in critical situations*

- HCV 4.1 Areas critical to water catchments
- HCV 4.2 Areas critical to erosion control
- HCV 4.3 Areas providing critical barriers to destructive fire.
- …Other (e.g. pollination services, fisheries, destructive wind…)

HCV 4 is considered a part of the human or social conservation values as it carries an implication that the services are critical to someone – a village, community or social group. In some cases, the ecosystem service may be considered critical for the long-term sustainable commercial use of the land, e.g. erosion of soils due to inappropriately sited plantations may not necessarily directly or critically impact human populations, but may severely damage the economic viability of the operation and preclude further productive land use if the operator abandons the area, including preventing a return to traditional use by local communities, or effective ecosystem restoration.

Purpose of analysis:

- To identify potential ecosystem services existing in the regional context
- To identify which of these services are potentially present in the management unit, and which may be shared across the 'wider landscape' containing the management unit.

Output:

Indicative maps of HCV 4 in the wider landscape, providing context for Management Unit-level assessment.

Suggested process for mapping HCV 4:

- Establish critical risk criteria (e.g. fragile soil types, slope limits for operations, watershed protection legislation) based on national standards, local consultation and expert knowledge.
- Map the factors defining potential HCV 4 areas:
  - Geophysical, topographic and landcover data as per HCV 3
  - National critical watershed maps, indicators and guidance
  - National erosion risk maps, indicators and guidance
  - National fire risk/fire incidence maps
  - Other natural hazards
  - Villages and other settlements
  - Critical infrastructure (such as major transport routes, reservoirs, hydroelectric dams etc)
- Establish area-based management requirements for critical risks
- Mapping: combined risk factors and area-based management requirements.

HCV 4 areas tend to be localized. In practice, mapping of erosion risk (HCV 4.2), should be done at the scale of the management unit, and HCV 4.1 and 4.3 at a slightly larger scale and with due consideration for communities downstream of the management unit, in particular those whose drinking water may be affected by pollution, sedimentation or other consequences of careless waste and water management.

6.2. Mapping HCV 5 and HCV 6 at large scales

HCV 5: *Areas fundamental to meeting basic needs of local communities*

and

HCV 6*: Areas critical to local communities' traditional cultural identity (areas of cultural, ecological, economic or religious significance identified in cooperation with such local communities)*

Purpose of analysis:

- To identify large-scale patterns of human settlement and land use in the regional context
- To identify groups and local communities which are present in the management unit, or may potentially be affected by containing the management unit
- To aid assessors in preparing a local consultation plan including preliminary selection of key communities likely to be affected by management operations and team selection for the necessary social assessment and engagement process.

Output:

Indicative maps of communities, social group characteristics, and land use, providing context for Management Unit-level assessment.

Suggested process for mapping HCV 5 and 6 at large scales:

- Preliminary or exploratory mapping of large-scale data (see Box 8) , specifically to aid community sampling decisions
- Site-level sampling of a subset of representative communities for understanding typical land use patterns, livelihoods, areas of activity and culturally important features
- Indicative mapping of potential HCV 5 and 6 (using e.g. land use radii and key landscape features such as natural ecosystems used to provide goods and services) based on explicit assumptions gained from community sampling

Social HCV maps developed in this way should be seen as tools for communication and negotiation between land managers and local stakeholders, for developing participatory management schemes, and for ongoing social engagement processes. These maps should also be linked to HCV 1, 2, 3, 4 to identify areas and values which are likely to come under pressure either from existing activities or from potential displacement of activities due to development.

Box 8 large scale data for HCV 5 and 6 preliminary mapping.

The information that can be gathered about social and cultural HCVs at the large scale is very limited and should only be considered a preliminary step to a full local consultation process. Useful data may include:

Populations and infrastructure:

Settlements

Population density indicators

Roads, bridges etc.

Political and administrative boundaries

Land ownership?

Population characteristics:

Ethnicity/language groups

Traditional cultural/land use practices?

Income and livelihoods (indicators?)

Indicative community land use radii?

7. Mapping HCVs and HCV management areas at the site level

7.1. Mapping HCVs in detail at the site level

What processes are needed to verify the presence of HCVs identified at the landscape level?

Site-level assessment techniques have been discussed in detail in recent guidance (i.e. Good Practice Guidance 2008) and in a number of national HCV toolkits. Do we need to improve or update this guidance to take account of conceptual progress or insufficient coverage of some HCVs? Does the HCV Network need to produce, adopt or endorse a site-level assessment guidance documentation?

What does landscape-level data tell us about the actual presence of HCVs?

A landscape-level analysis usually gives indications of potential HCVs at a coarse level of resolution, which may be insufficient for management unit level planning. Depending on the quality of data and existing knowledge available, it is usually necessary to conduct a site-level investigation to determine the actual presence and location of HCVs. This may involve further desk studies and discussion of higher-resolution data at the site level, and an element of fieldwork.

Even if excellent biological or ecological data are necessary at the right spatial scale within the management unit, if social HCVs are likely to occur, site level assessment to determine those values and map the associated management areas will usually be necessary.

What data resolution is required to delineate different HCVs at the site level?

How do we communicate the outcomes?

Maps should be understood to be tools for communication, negotiation and planning, rather than an end goal. How do we ensure that maps of potential HCVs are clearly identified as such and are not misused?

Do the answers to these questions differ between land use scenarios?

7.2. Delineating HCV management areas

The aim of an HCV management plan should be to maintain or enhance all the HCVs identified within the Management Unit, and within the wider landscape so far as management influence allows. This normally requires maps of the areas which need to be managed in specific ways.

HCV management prescriptions, and HCV management areas where these prescriptions are applied, will depend on a combination of the HCVs present, the

threats to the values (determined by the landscape and local contexts), and the ability and responsibility of the land manager to manage and mitigate these threats. Some values are widespread, whilst others are very localised, and managers will need to consider whether special measures must be applied across the management unit as a whole, or be focused on specific areas.

In the following discussion we have treated biological and social HCV separately, in the order previously used. *However, effective management of biological values ultimately needs to be integrated with social values.*

Setting HCV management objectives:

For each HCV identified at the landscape and site scale, the land manager needs to set a **management objective** which fulfils the requirement to maintain or enhance the value.

For biological HCVs, this process is a familiar one, corresponding to **target setting** in systematic conservation assessment, but the principle applies both to social and biological HCVs. Examples of targets include:

- Numbers of breeding pairs of a critical species to be maintained in the MU
- Number or quality of critical resources (e.g. fruit trees, salt licks, microhabitat patches etc.) required to support healthy populations of dependent species
- Area of minimally disturbed ecosystem required to maintain healthy ecosystem functions
- Habitat or ecosystem area required to protect watersheds and rivers
- Yield of timber products from community-managed forests for domestic use
- Area required for village subsistence collection of food, medicines etc.

These targets must then be translated into HCV management areas, which may be larger or smaller than the total area within which the HCV actually occurs – e.g. it may be necessary to create buffer zones for fragile habitats (HCV management area larger than the habitat itself) – or simply to manage key resources (e.g. roosting sites) for wide ranging animals (HCV management area smaller than the range of the species);

7.3. HCV management areas and management targets for HCV 3

Management objectives for HCV 3 should bear in mind the CBD definition of an ecosystem as a dynamic complex of plant, animal and micro-organism communities and their non-living environment **interacting as a functional unit**. The objective of HCV 3 management should therefore be

- to preserve the range of species which characterise that ecosystem, and
- to maintain or restore the ecosystem's functionality (Box 9).

If an ecosystem is identified as HCV 3, by definition every remaining area is of great significance. The default management target should be that 100% of HCV 3 areas are preserved (see examples below of how to proceed if this is not a viable strategy).

Box 9: What do we mean by ecosystem functionality in a management context?

Ecosystems are characterised by communities of species and their physical environment. **Ecosystem functions** are the higher-order processes which result from the complex interactions of the living and non-living components, for example:

- regulation of the water and nutrient cycles,
- soil fertility,
- primary production (related to timber yield in forests),
- secondary production (related to the regenerative capacity of animal populations),
- mutual dependencies between species (e.g. pollination and fruit dispersal mechanisms),
- species composition and successional patterns.

Depending on its characteristics (e.g. fragility or resilience) and if responsibly managed, a healthy ecosystem may be exploited to provide a sustainable flow of goods and services whilst maintaining its functionality.

HCV 3 management areas for natural forest management:

In the context of forestry, some HCV 3 ecosystems may be subject to extractive management, so long as operations do not threaten the viability of the constituent species populations or the functionality of the assemblage as a whole (see box). In practice this often means that representative areas of HCV 3 ecosystems should be set aside for complete protection (representational conservation is also a requirement of FSC Principle 6), and that if any operations are carried out in HCV 3 ecosystems these should be low-impact, and carefully monitored for adverse effects. If HCV 3 ecosystems within a forestry context are believed to be fragile or particularly susceptible to disturbance (E.g. some aquatic ecosystems are particularly susceptible to siltation and pollution), extractive uses may not be appropriate, and it may be necessary to create and appropriately manage buffers, in which case the HCV management area will be larger than the HCV 3 ecosystem.

HCV 3 management areas in the context of conversion

If HCV 3 ecosystems are identified within an area of existing natural or traditionally managed vegetation which is scheduled for conversion, the appropriate management area for HCV 3 ecosystems may need to extend beyond the boundaries of the identified ecosystem e.g. include a buffer zone of natural vegetation or managed forest, as ecosystem functionality may be compromised by edge effects. The extent and configuration of appropriate buffer zones needs to be defined in consultation

with appropriate experts and should consider opportunities for community activities within the buffer zones and the HCV ecosystem itself, which are compatible with the conservation objectives.

Conservation of degraded or fragmented HCV 3 ecosystems

In many cases HCV 3 ecosystems within existing landscapes occur as highly degraded and/or fragmented remnants of a previously much more extensive ecosystem, which has been converted through decades or centuries of human activities. The ecosystem functionality in this case may already have been severely compromised by fragmentation. However, these fragments are often extremely significant for biodiversity: for example, the Atlantic Forest of Brazil is extremely fragmented and covers only 7% of its historical range; the remaining fragments support 8,000 species of endemic plants (40% of the total species), 567 species of endemic vertebrates (42% of the total species), and nearly ¾ of Brazil's recognized threatened species in total.

When planning plantations in an area where HCV 3 fragments exist, the baseline policy should be not to convert any fragments of HCV 3 ecosystem of any size, mapped to the best available resolution. A holistic conservation plan should be developed to preserve the fragments, halt the processes leading to their degradation or destruction, and aim to restore or the functionality of the ecosystem so that its long-term persistence is assured (see also Annex 3). This is likely to require the specialist skills of a trained landscape ecologist and the voluntary and long-term participation of local communities, obtained and maintained through a community engagement process.

7.4. HCV management areas and management targets for HCV 1

Species-specific conservation measures should be aim to maintain or enhance the population viability of the species in question. Targets for habitat conservation should be set with this objective in mind. Management of HCV 1 is strongly linked to HCV 3 and should be planned in conjunction with the HCV 3 approach previously outlined.

- The default assumption should be that 100% of the suitable habitat for HCV 1 species should be preserved, including suitable buffer zones if management is likely to create disturbance.
- Where this is not feasible, a quantitative target for suitable habitat should be produced, based on an understanding of minimum viable populations (see Box 10) and with a precautionary safety margin to ensure persistence of the species.
- Any decision to convert habitat suitable for HCV 1 species should be taken as a last resort when other options are demonstrably not feasible. Opportunities should be sought to restore and safeguard other areas which will maintain or enhance the species (see Fig 6 and Annex 3), and these should be documented and justified as part of a knowledge-based, integrated conservation plan,

Within FSC certification for forest management, these HCV 1 management areas may be combined with the FSC's requirement for preserving representative areas of natural ecosystems.

Special cases of HCV 1 management

Additional consideration should be given to managing species which are not closely tied to HCV 3 habitats i.e.:

- wide ranging species with broad habitat requirements,
- species associated with small scale ecosystems ('micro-habitats').

Wide ranging species:

HCV management for wide-ranging species will likely rest on the conservation of suitable key resources and habitat areas, using the HCV 3 conservation areas as a core (if HCV 3 is present in the Management Unit) and supplementing these with areas of representative natural vegetation which are managed for conservation purposes (e.g. as set-asides, low-impact harvesting areas or for carefully managed community use).

Where typical management units are not large enough to support viable populations of large, wide-ranging animals, effective conservation of such populations depends on the actions of the MU's neighbours in the landscape. Managers should seek to cooperate with their neighbours in coordinating management measures for such species. If there is a regional or national conservation plan for the species of

concern, managers should seek to integrate management measures with the recommendations of that plan.

Species associated with 'micro-habitats' in the management unit.

Many species have specific, small scale habitat requirements and low dispersal rates, which makes them vulnerable to being overlooked in HCV assessments which focus on broad habitat types. Often these species are endemic or range restricted – many frogs, freshwater fish and invertebrates fall into this category. Microhabitats may be associated with HCV 3 ecosystems or may occur sporadically throughout more widespread habitat types.

Conservation of these species depends on their recognition and an understanding of the suitable microhabitats. These should be identified by competent biologists during site level investigation. In the context of forestry, suitable habitat for localised or range-restricted species can be added to representative areas for conservation (as required by FSC).

Box 10: Maintaining viable populations of species in a production landscape matrix

Conservationists have devoted great effort to understanding how to define and maintain viable populations of threatened species. The question for conservation management often boils down to 'how much is enough' i.e., what is the minimum area of natural habitat required to ensure that a population persists indefinitely? Ideally, an indication of the population that the management unit can support may be obtained from existing literature or through consultation with an expert, in order to make a scientifically justified selection of HCV 1 areas.

Individual management units may not support viable populations of larger animals, but may play a vital role as part of a larger habitat matrix. The appropriate question for land use managers is then 'how much suitable habitat should be managed specifically for threatened species within the management unit, so that they can persist across the wider landscape'? In this case targets should be set based on the total viable population, and what proportion of that should be maintained in the MU: for example, if the entire landscape can support an estimated 400 individuals and the management unit corresponds to 5% of the area, then the MU should aim to support 20 individuals.

Setting area targets to maintain viable populations requires a good understanding of species characteristics, and so can only be applied rigorously for a few well-studied species. Managers need to consult the appropriate species specialists and use a precautionary approach

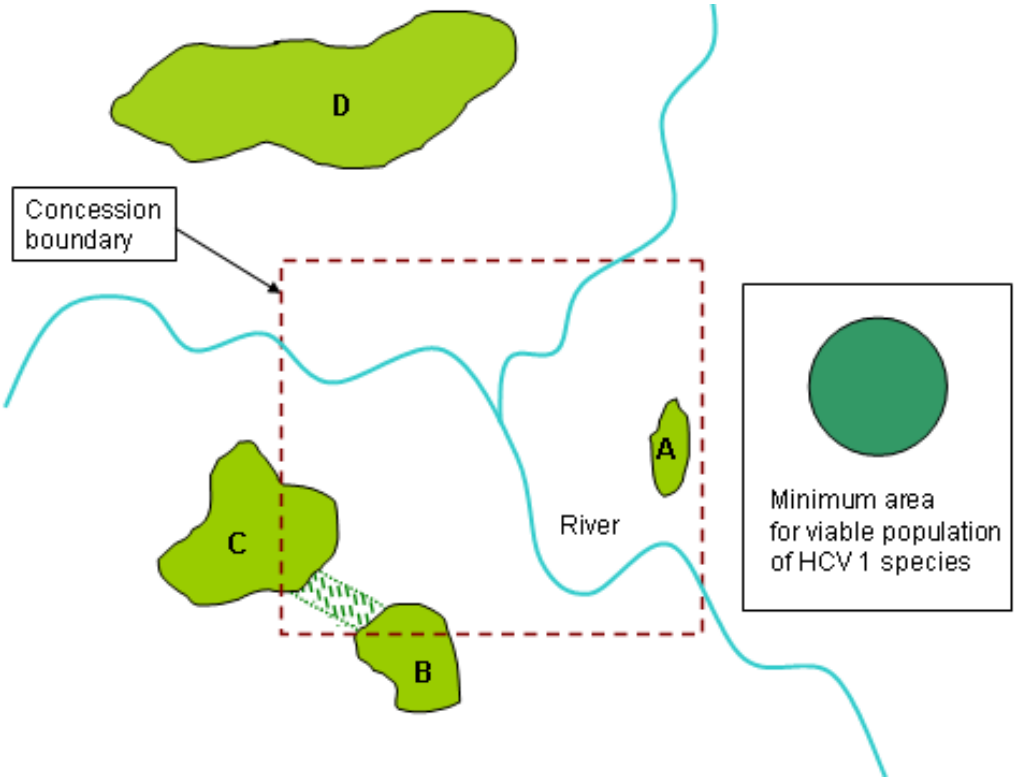

Fig 6: A fictitious, simplified example of the use of minimum viable population analysis for HCV management decision-making. An agricultural concession contains or neighbours with several fragments of suitable habitat (A-D) for an endangered (HCV 1) species; other areas are low-value pasture and the species cannot travel easily from patch to patch. All else being equal, none of the HCV 1 areas *within* the concession boundary can support viable populations, but if B and C are stable and face little or no further exterior threat, area C as a whole could possibly support a population. Damaging areas B and C within the concession would almost certainly prevent viable populations surviving in either of these fragments as a whole. Linking B and C could greatly improve long-term persistence of the population, and all other things being equal, the formation of a corridor could *potentially* justify the sacrifice of area A, which has the least value due to its small size and isolation. If exterior threats do exist, it would be unwise to convert any area capable of supporting HCV1, and all such areas might need more active management and/or restoration to ensure species persistence.

7.5. HCV management areas and management targets for HCV 2

TBC – feedback is requested from the HCV Resource Network membership on their experience of the application of HCV 2 for conservation planning and management –

OTHER USEFUL GUIDANCE:

For biological HCV management, do we need a section on principles of responsible plantation design – corridors, representative habitat set-asides, patches, connectivity etc? ***Would it be useful to facilitate a dialogue on such principles between industry and conservation stakeholders?***

7.6. HCV management areas for social HCVs (4, 5, 6)

For social HCVs and especially HCVs 5 and 6, management decisions should be discussed with the affected communities, and maps of potential community use areas or cultural sites should be drawn up and agreed using participatory field methods. Any decisions should be made with the free, prior and informed consent (FPIC) of parties involved.

The issues to consider in regards to management options of HCV 5 & 6 include:

- **Reversibility** – This not only includes physical reversibility of the operations, but also with regards to potential changes in responsibility for managed areas. E.g. what happens if the company sells or abandons a concession? Whose responsibility will it be to ensure that what is agreed as a management decision is continued?
- **Dependency** – Will the management options put forward cause the communities to become dependent on the management organisation or company to fulfil their basic needs? This is particularly critical when scheduled conversion is likely to change the landscape significantly.
- **Appropriate substitution** – If a management prescription is to substitute the HCV identified with other options – these need be appropriate. E.g.: is it appropriate to substitute the provision of medicinal plants for traditional healing with free medicine? With a local clinic? With cash payments?
- **Mitigation** – management options only specify what needs to be done to ensure that identified HCVs are maintained – what happens when the agreed management options is not sufficient (especially HCV 5)? E.g. a management prescription to leave a corridor for wildlife, theoretically meaning that sources of bush meat are maintained – what happens if even with the corridor, the wildlife all but disappears from the area?

What further sources do we need to include for appropriate social methodologies? Do we need to promote a stakeholder dialogue on the issue of social HCV management? If so, what process should we follow?

Annex 1: Table of Workshop participants.

Participant	Organisation
Sidney Rodriguez	WWF Brazil
Monica Harris	Fauna and Flora Intl
Thomas Barano	WWF Indonesia
Paul Jepson	University of Oxford, Oxford Centre for the Environment
Bob Smith	Durrell Institute of Conservation & Ecology, University of Kent
Graham von Maltiz	Council for Scientific and Industrial Research, S. Africa
Helio Jorge da Cunha	Ministry of Environment, Government of Brazil
Gary Paoli	Daemeter Indonesia / HCV Resource Network Technical Panel
Tatiana Yanitskaya	WWF Russia / HCV Network Technical Panel
Leon Benun	Birdlife International
Jorn Scharlemann	UNEP/WCMC
Nigel Dudley	Equilibrium Consulting/ HCV Network Technical Panel
Jim Strittholt	Conservation Biology Institute/ HCV Network Technical Panel
Anders Lindhe	Independent consultant
Laura Somerville	Fauna and Flora Intl / HCV Network Steering Group
Mark Leighton	UNEP GRASP
Andrew Knight	Dept of Conservation Ecology and Entomology, University of Stellenbosch
Elaine Cristina Teixeira Pinto	FunBio Brazil
Marcus Colchester	Forest Peoples Programme/ HCV Network Steering Group co-chair
Jeff Hayward	Rainforest Alliance/ HCV Network Technical Panel
Nilofer Ghaffar	HCV Network Secretariat
Tim Rayden	ProForest
Christopher Stewart	HCV Network Secretariat

Additional thanks are due to Pep George, Ruth Nussbaum and Malika Virah-Swamy (ProForest) for their participation and help in facilitating this event.

Annex 2: Criteria for potential impact of operations

Criteria are taken from the HCV Resource Network Technical guidance for peer reviews of HCV assessment reports.[10]

Category 1:

Large-scale land-use planning (e.g. regional or national level); very high impact operations, involving complete, irreversible alteration of ecosystems/natural vegetation, and potentially very severe impacts to, or even elimination of, any HCVs in the area, e.g.:

- Large-scale conversion of natural ecosystems to agriculture or plantations
- Large scale operations in highly sensitive/vulnerable ecosystems (e.g. peat swamps)
- Operations likely to have an irreversible and damaging impact on vulnerable communities

Category 2:

High impact operations, involving extensive alterations of the ecosystem or potentially severe impacts on HCVs, which are reversible in the medium to long term and can be mitigated by good management, e.g.:

- Small to medium scale conversion of semi-natural/highly degraded ecosystems to agriculture or plantations
- Large-scale forest management
- Medium-large scale plantations operations in largely agricultural landscapes
- Operations likely to affect substantially the livelihoods of communities.

Category 3

Medium or low impact operations, where alterations to the ecosystems are likely to be minimal, or moderate and localised, and reversible in the medium to short term, e.g.:

- Small to medium scale forestry operations in resilient/common forest ecosystems
- Small-scale and low intensity community forestry operations
- Small scale changes in crops in largely agricultural landscapes

Note: these examples are not exhaustive and are intended to provide an indication of the likely category of impact. Each case should be considered on its individual characteristics.

Annex 3: HCV 3 and conservation offsets*

Conserving, managing and monitoring multiple fragments of HCV 3 ecosystems in a production landscape is likely to present major challenges for land use managers. It may be the case that preserving small, outlying or highly vulnerable HCV fragments is beyond the management capability or resources of the manager.

Within the context of a holistic HCV management plan, and if it becomes clear that the cost and effort of managing some HCV 3 fragments outweigh the conservation gains of investing that effort elsewhere, it may be defensible to simplify the management burden by exchanging outlying or very degraded areas for legitimate conservation gains of equal or greater value (i.e. a legitimate conservation offset).

Any such process should take into account basic principles of conservation biology, threat considerations and available resources. It should be stressed that 'conservation offsets' are a last resort, if all other conservation efforts have failed or are irretrievably flawed, and should in no case substitute actions which the manager should undertake as a matter of course as part of HCV management.

A legitimate conservation offsetting process might rank the conservation priority of fragmented ecosystems according to the following criteria:

- Size
- Shape
- Ecosystem quality or degradation index
- The matrix of neighbouring vegetation
- Connection to other fragments via riparian or other natural corridors
- Distance to nearest remnant HCV fragment or other natural vegetation areas
- Distance to roads, villages or other sources of potential disturbance
- To the maximum extent possible, presence and population density of HCV 1 species (rare, threatened or endangered species, ranked e.g. in order of their IUCN threat status or their actual threat status in the landscape)

Lowest conservation priority should be given to smaller, more disturbed fragments that are isolated from other remnants and embedded in a highly disturbed matrix with little or no possibility for direct or 'permeable' connections to other suitable habitat types. Highest conservation priority should be given to larger more intact fragments, especially where there is a possibility for connectivity with other such fragments within or bordering the Management Unit. If a fragment identified under HCV 3 is proposed for conversion on grounds that the conservation value does not justify the effort required, then a specific plan for offsetting this loss by equal or

* *with thanks to G. Paoli for much of the content of this section.*

greater gains elsewhere in the estate should be developed, and preliminary steps taken to implement the offset prior to converting the fragment.

Both the proposed conversion of 'lower-priority' or 'un-conservable' fragments and the process of securing management rights to the proposed offset should follow a process of Free, Prior and Informed Consent (FPIC) with any communities or individuals holding legal or customary rights to that land. The documented justification of this swap should be made publicly available on request. Ideally any proposed swap would be reviewed by an independent third party prior to implementation.

Legitimate conservation gains may include one or more of the following:

- Increased size of HCV 3 fragments under management
- Increased connectivity (e.g. corridors) between higher-priority fragments
- Restoration of degraded habitat
- Conservation beyond the MU boundaries?

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1 References

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