HIGH CONSERVATION VALUE (HCV) SCREENING

GUIDANCE FOR IDENTIFYING AND PRIORITISING ACTION FOR HCVS IN JURISDICTIONAL AND LANDSCAPE SETTINGS

HCV RESOURCE NETWORK

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ABOUT THE HCV NETWORK

The High Conservation Value Resource Network (HCVRN) is a member-based organisation composed of NGOs, commodity producers, companies, certification schemes and conservation organisations who care about protecting outstanding environmental and social values. The HCVRN was set up in 2006 to promote best practice and consistent implementation of the HCV approach.

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ACRONYMS

BMZ	German Federal Ministry for Economic Cooperation and Development
CBO	Community-based Organisation
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CR	Critically endangered (IUCN Red List)
EIA	Environmental Impact Assessment
EN	Endangered (IUCN Red List)
FPIC	Free Prior and Informed Consent
FSC	Forest Stewardship Council
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
HCV	High Conservation Value
HCS	High Carbon Stock
HCSA	High Carbon Stock Approach
HCVRN	High Conservation Value Resource Network
IFL	Intact Forest Landscape
IUCN	International Union for Conservation of Nature
KBA	Key Biodiversity Area
LCP	Landscape Conservation Plan
MU	Management unit
NGO	Non-governmental organisation
NI	National Interpretation
NTFP	Non-timber forest products
RTE	Rare, threatened and endangered
Vu	Vulnerable (IUCN Red List)
UNESCO	United Nations Educational, Scientific and Cultural Organisation
WWF	World Wide Fund for Nature

INTRODUCTION

The purpose of this document is to describe a methodology called High Conservation Value (HCV) screening. HCV screening is a desktop exercise that uses the six HCV definitions (Figure 1) to characterise the environmental and social aspects of a landscape or jurisdiction. Screening considers: the likelihood that HCVs are present, identifies threats to those HCVs and indicates which values are most urgent to attend to with follow-up discussions and actions. This guidance was first developed in 2018-2019 and published in April 2019 - a result of building on HCV Common Guidance and gathering input from discussions with practitioners. In 2020 the guidance was updated to incorporate learning and experience from HCVRN-coordinated screenings and inputs from other practitioners who have been conducting screenings. HCV screening teams are the primary audience for the document, but it should also be informative for stakeholders involved in screening processes and for those involved in the wider project or initiative in which a screening is being conducted (e.g. government technical staff, NGOs, donors and investors).

1 HCV APPROACH

The HCV approach is based on six values (Figure 1), whose definitions are globally applicable, but which can be interpreted and adapted for different countries[1] and landscapes.

Figure 1. Full definitions of the six HCV categories.

SPECIES DIVERSITY

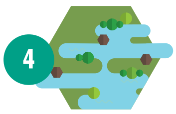
Concentrations of biological diversity including endemic species, and rare, threatened or endangered species, that are significant at global, regional or national levels.

LANDSCAPE-LEVEL ECOSYSTEMS, ECOSYSTEM MOSAICS AND IFL

Large landscape-level ecosystems, ecosystem mosaics and Intact Forest Landscapes (IFL) that are significant at global, regional or national levels, and that contain viable populations of the great majority of the naturally occurring species in natural patterns of distribution and abundance.

ECOSYSTEMS AND HABITATS

Rare, threatened, or endangered ecosystems, habitats and refugia.

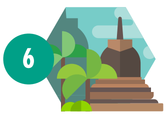


SYSTEM SERVICES

Basic ecosystem services in critical situations, including protection of water catchments and control of erosion of vulnerable soils and slopes.

COMMUNITY NEEDS

Sites and resources fundamental for satisfying the basic necessities of local communities or indigenous peoples (for livelihoods, health, nutrition, water, etc...), identified through engagement with these communities or indigenous peoples.



CULTURAL VALUES

Sites, resources, habitats and landscapes of global or national cultural, archaeological or historical significance, and/or of critical cultural, ecological, economic or religious/sacred importance for the traditional cultures of local communities or indigenous peoples, identified through engagement with these local communities or indigenous peoples.

[1] https://hcvnetwork.org/library/national-interpretation-processes/

The HCV approach was created more than 20 years ago as a management unit (MU)-level tool and framework to protect important environmental and social values as part of sustainable forest management in Forest Stewardship Council (FSC) certified forests. Its application has since expanded to other commodities and ecosystems, so that over the last decade or so maintaining HCVs has become a key component of responsible production and resource use. HCV requirements are included in nearly 20 certification schemes[2].

A basic requirement of HCV assessments (and a guiding principle of the HCVRN) is that the identification of values in a MU should take account of the 'wider landscape' (particular configuration of topography, vegetation, geology, land use and human settlement). This geographical context often determines whether a given feature of the MU is an HCV, and effective HCV management at the site-level requires a good understanding of the 'wider landscape'. If HCVs are identified and managed in individual MUs without the benefit of a coordinated large-scale approach, this creates a risk that such case-by-case HCV assessments, using variable methodologies, could result in conflicting maps and management recommendations. This will lead to poor implementation, and damage to HCVs. To minimise these risks, stakeholders (forest and plantation managers, certification bodies, investors, supply chain organisations, social and environmental NGOs, government planning offices and others) need consistent guidance on HCVs at large spatial scales.

[2] E.g. Forest Stewardship Council, Roundtable on Sustainable Palm Oil, Bonsucro, Roundtable on Sustainable Biomaterials, International Sustainability and Carbon Certification, The Climate, Community and Biodiversity Alliance, Fairtrade, The ProTerra Foundation, Better Cotton Initiative, Aluminum Stewardship Initiative, Soil Association, Aquaculture Stewardship Council, Rainforest Alliance – UTZ, Equitable Origin, Floraverde Sustainable Flowers, LIFE (Lasting Initiative for Earth), REDD+ Social and Environmental Standard

SCALING UP THE HCV APPROACH

In addition to its widespread use in certification, the HCV approach is a useful tool and framework to use as part of land use planning exercises. The approach has been used at a landscape scale, to some degree, for over a decade (HCVRN 2009)[3], though in recent years with the uptake of landscape and jurisdictional initiatives, the application of the HCV approach at larger scales is increasingly in demand. There is growing interest from governments and multilateral institutions to commission and/or support and facilitate large-scale application of the HCV approach to guide land use planning, sustainable sourcing initiatives, legislative and regulatory measures, etc.

Landscapes can be defined by natural characteristics (e.g. ecosystems, major vegetation types, watersheds, biomes, or ecoregions) or by social characteristics (e.g. legal, political, administrative, or cultural boundaries). A **landscape approach** is "a framework to integrate policy and practice for multiple [and often] competing land uses through the implementation of adaptive and integrated management systems" (Reed et al. 2016)[4]. Any actor or group of actors can initiate a landscape approach. Typically, it involves collation of information (e.g. on land and resource use and rights, habitat and species distributions, and environmental and social values), multi-stakeholder consultation, collaboration and consensus-building and the development of governance institutions and mechanisms for application and monitoring.

A **jurisdictional approach** is a type of landscape approach that is applied to a jurisdictional (legal administrative) unit and in which the relevant jurisdictional (government) authority plays a major role. A jurisdictional unit may be e.g. a municipality, a district, a province, a state, or a whole country. Jurisdictional approaches require committed, actively engaged authorities. This creates opportunities for effective land use planning, formal recognition of land rights, compensation, legislation, law enforcement, stakeholder engagement and redress.

Throughout this document the terms landscape and jurisdiction are used together or interchangeably because HCV screening can be used in a landscape encompassing multiple jurisdictions, or for a single jurisdiction. If jurisdictional boundaries cut an arbitrary line across a habitat, watershed, or village territory – it is important to consider the functional landscape beyond jurisdictional boundaries for long term HCV maintenance.

[3] Stewart, C. and T. Rayden. 2009 (May). Mapping High Conservation Values at large scales for effective site-level management. Public consultation draft 1.

[4] Reed J., J. Van Vianen, E.L. Deakin, J. Barlow, and T. Sunderland. 2016. Integrated landscape approaches to managing social and environmental issues in the tropics: learning from the past to guide the future. Global Change Biology 22: 2540–2554.

2 WHAT IS HCV SCREENING?

HCV screening (or an HCV screening exercise) is a tool for identifying which types of HCVs may be present in a landscape, and where targeted follow up work is most needed – based on e.g. where HCVs face different types of threats and the objectives of the screening. In general, screening is high-level, large-scale, and conducted through desktop work – combined with some consultation. Screening can highlight important values and areas, identify information gaps and spark stakeholder discussion about long-term sustainability in their landscape. Then stakeholders can determine how screening results would fit into larger plans for the jurisdiction or landscape, and what resources may be required to move forward with prioritising actions in these large-scale settings. Screening is a flexible tool, which should be adapted and can be refined over time. The steps in Figure 2 are meant as guidance, and the examples used here present only a few ways the tool can be used. The HCVRN Secretariat intends to continually engage with practitioners who conduct screenings to better understand the different ways it is being and can be used – and to share that in the future through case studies, webinars or other means.

Screening should be used in combination with site-level activities (e.g. field work, participatory mapping) and therefore results must not be used as a shortcut to by-pass local-level field work, consultation and FPIC that is necessary for a full land-use planning process or site-level HCV or HCV-HCSA assessment. Annex 2 shows how screening can contribute to site-level assessments and activities. Strictly speaking, full local (community-level) consultation is not usually possible during a landscape-level HCV screening exercise because of the time it takes. Therefore, the results of the HCV screening are insufficient and inappropriate as a basis for issuing specific recommendations on HCV management and monitoring for all six HCV categories or for finalising land use plans.

Though HCV screening is largely a desktop exercise, depending on the context, the objectives and the resources available, varying degrees of effort can be invested in more localised data collection, mapping, and stakeholder engagement. The more effort invested during the screening exercise, the more detailed and robust the results can potentially be.

Figure 2. Overview of HCV Screening steps.

STEP 1

Define purpose and scope

State the purpose of the screening exercise and define the area to which the screening will be applied.

STEP 2

Gather information for analysis

Gather information including literature review, spatial data and stakeholder and expert consultation to provide the basis for estimating which HCVs and threats are likely to be present in the landscape.

STEP 3

Determine likelihood of HCV presence

After considering available data, prepare lists of potential HCVs, contextual and/or tabular descriptions of potential HCVs, lists of information sources and HCV probability maps (where relevant).

STEP 4

Determine likelihood of threats to HCVs

Prepare list of potential threats and consider their impacts on HCVs, then prepare contextual and/or tabular descriptions of threats, lists of information sources and threat maps (where relevant).

STEP 5

Identify priorities in the landscape

Overlay (maps) or consider together (contextual information) probabilities and threats to determine where in the landscape to focus conservation and community engagement efforts. This step is essential for prioritising and planning interventions and next steps.

STEP 6

Present results

The screening process and results can be shared with stakeholders during the process to gather input. The results should be developed into a final report with accompanying data and references.

STEP 1: DEFINE PURPOSE AND SCOPE

PURPOSE

There may be many reasons or motivations for conducting an HCV screening exercise, for example screening may be conducted as an input to:

LAND USE PLANNING AND MANAGEMENT

HCV screening can inform and guide land use planning, by compiling social and environmental information to help identify priority values for conservation and livelihoods, and to plan for intervention and engagement. Screening develops a description of the landscape integrating biodiversity and social values, which would be a useful dataset for government (e.g. for spatial planning, licensing of industry, infrastructure planning). For example, an approach based on data and analysis can inform the revision of spatial plans or “Green Growth Initiatives” and for alignment of government and company sustainability plans.

Screening could be used by CSO or NGO forums to influence government and industry whilst all using consistent datasets. And screening can enable existing datasets that have been collected by NGOs (e.g. participatory mapping, data on RTE species) to be used to inform policy and landscape management. Participation in a screening exercise could enable a community to express concern about environmental issues (e.g. pollution of rivers, wildfires) and elicit action from land managers. It could also provide an opportunity to meaningfully connect local-level participatory mapping and land tenure status with higher-level land use planning.

If screening is being used as part of a jurisdictional initiative, a multi-stakeholder process should have started prior to screening. The details of the screening can then be planned in consultation with the different actors involved and the screening results can inform subsequent steps in the overall process.

JURISDICTIONAL CERTIFICATION

Commodity certification schemes usually rest on certification of individual MUs (or groups of MUs). Where standards require HCV or HCV-HCSA assessments, these are normally commissioned (or conducted) separately for each MU. However, as neighbouring MUs usually share much the same environmental and social features in a wider landscape context, separate site-level assessments inevitably generate a significant amount of overlap and repetition and incur higher costs. To an extent, jointly commissioned HCV landscape screenings could reduce duplication and create cost-effective frameworks for simpler, streamlined follow up assessments at the MU level (See Annex 2). Such cooperative or centralised screening could be initiated by groups of concessionaires, by government or by certification schemes to achieve consistency and benefits of scale. This could be particularly useful when one company owns adjacent plantations, or multiple plantations in a larger landscape.

SUPPLY CHAIN RISK MANAGEMENT

Jurisdictional authorities or companies may commit to no deforestation, no destruction of peat and no exploitation of local communities (NDPE), and the six HCV definitions overlap significantly with these concepts. HCVs represent values widely agreed to be of utmost environmental and social significance. As such, HCVs (together with basic requirements related to tenure, rights and FPIC) may form minimum responsibility criteria separating 'acceptable' from 'unacceptable' produce, thereby allowing e.g. smallholders to enter supply chains and gradually improve their practices to meet more stringent production requirements. HCV screening may serve as a first filter to identify values and areas that need local-level attention and support to reduce and mitigate risks related to non-compliances with such minimum requirements. The greater the level of effort and stakeholder engagement during the screening process, the more robust and detailed the results of screening will be and therefore the lower the risk for investors and others. Screening may also be used by industry forums, whether it be companies involved in the same industry or different industries (e.g. forestry, mining, and agriculture) who want to align their objectives and implement land management / sustainability plans that are consistent with one another.

In addition to the overall purpose of the screening exercise, it us useful to consider:

- What organisation or which parties are commissioning the HCV screening?
- Which stakeholders will be involved and how?
- How will/might the outcomes of the screening be used? By whom?
- How can the screening be participative and how can information be shared with stakeholders?

BOX 1: EXAMPLES OF STAKEHOLDERS TO ENGAGE WITH DURING SCREENING

- Relevant national or regional government ministries
- Relevant province, regency, district, or village governments
- Environmental NGOs
- Social NGOs and CBOs, including representative indigenous and community organisations
- Academics and local consultants and others with relevant environmental and social expertise
- Experts involved in HCV NI elaboration

DEFINE THE GEOGRAPHIC SCOPE

In principle, there is no upper size limit for screening; however, it is important to have realistic expectations on the relations between the size of the screening area, the efforts involved, and the level of detail of the results. For small jurisdictions with abundant resources one may be able to do a detailed ("wall-to-wall") HCV assessment of the whole jurisdiction, in others screening may be used alone to identify coarse-level priorities, requiring significant additional local-level work to underpin management and monitoring, recommendations and planning.

The screening exercise can be based on a given ecological or social landscape. Definition of the ecological or biophysical landscape boundaries should be guided as far as possible by an existing national conservation framework. 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. Definition of a social landscape may take a very different approach and be based on e.g. the location and distribution of ethnic groups or the extent of a customary territory. 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 and is therefore a useful way to define the boundaries of the screening. However, if large-scale biogeographic patterns are very different from political boundaries, the screening analysis may need to cross political boundaries.

DEFINE THE SCOPE OF ACTIVITIES

For example:

- Will HCV screening be combined or used together with other initiatives? One example is landscapes or jurisdictions where elements of both the HCV and the High Carbon Stock (HCS) approaches are being scaled-up and applied together (See Annex 3).

- To what extent will the screening include consultation, field visits etc. and what are the implications in terms of the level of detail that the screening aims to achieve?

- For the screening of the social HCVs, consider the level and extent of consultation to be undertaken, and whether any community sampling and will be undertaken. The approach should be justified in terms of available data, and what level of engagement with communities or their representatives has taken place prior to the screening, and any broader existing process that the screening is part of.

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STEP 2: GATHER INFORMATION

Information gathering, including literature review, spatial analysis and stakeholder and expert consultation, is the basis for the screening exercise and results, and therefore the best available information should be used. Annex 1 provides examples of useful data types and sources. Both site-level HCV assessments and HCV screening are information-based, incorporating, and using relevant data and knowledge. However, the granularity of the information or the possible level of detail that can be covered will differ between landscape and site-scale. In each landscape, the quantity and quality of data will vary between locations (how much information is available) and for different HCVs within a landscape (some HCVs may have more readily accessible information). It is important to be clear about the limitations and certainty of data, so that the subsequent activities can potentially address information gaps. Where gaps in information are identified, the precautionary approach should be applied.

BOX 2: PRECAUTIONARY APPROACH

In the context of HCV identification or estimating the probability of HCV presence, use of the precautionary approach means that when there are reasonable indications (e.g. secondary data and expert opinion) that an HCV is present, the screening team should assume that it is present or that there is a high probability of presence. Where threats to HCVs are likely to be severe (e.g. land use change scenarios), and where the stakes are high in terms of habitat loss or displacement of local peoples' resource use, the precautionary approach is especially important because of potential threats of severe or irreversible damage to the environment or to human welfare. In these cases, responsible parties need to take explicit and effective measures to prevent the damage and risks, even when the scientific information is incomplete or inconclusive, and when the vulnerability and sensitivity of values are uncertain.

CONTEXTUAL VERSUS SPATIAL INFORMATION

When conducting HCV screening exercises, several practitioners find it useful to differentiate between contextual and spatial information. Contextual information tells something about the presence or absence of HCVs and threats to those HCVs, without necessarily providing information on where exactly these HCVs and threats are located within the study area. Examples of contextual information include IUCN species distribution information, survey information from secondary literature, reports from stakeholders and experts and anecdotal information on the presence or absence of specific HCVs and threats in the study area.

Spatial information, on the other hand, uses spatially explicit information to differentiate between probability of presence of HCVs and threats within the study area. A land cover map, for example, might be used to identify the habitats within the project area where specific RTE species are most likely to be present. While contextual information would thus typically be used to identify HCVs and threats that might be present within the project area, spatial information can be used to assess spatial differences in the likelihood of each of these HCVs and threats within the project area.

SPATIAL INFORMATION

Spatial information including satellite products, GIS layers, and hardcopy reference maps, are essential data sources for the screening of HCV 1-3, and often of (some aspects of) HCV 4. Considerable effort should thus be invested in identifying spatial data that can be used for this purpose. The screening team should ensure that appropriate data sources are used for the purpose of the screening exercise. For example, satellite products with a sufficiently high resolution should be used for developing a land cover map, or land cover map products should differentiate between enough land cover classes to be able to screen for HCV 1 habitat. Ideally, information on the accuracy of mapping products should be collected, e.g., through the construction of accuracy matrices based on high-resolution imagery, and the team should flag any uncertainties resulting from mapping inaccuracies in the report.

In some cases, it may be difficult or impossible to find high-quality reference maps or other GIS products that match the entire scope of the screening exercise. In that case it should be acknowledged that a uniform accuracy level could not be reached across the whole screening area. It might also be possible that screening of the total project area informs the need for collecting more detailed data products for specific geographies within the overall screening area. For example, while a rather coarse GIS product might be appropriate for identifying potentially critical ecosystems (HCV 3) within the screening landscape, satellite products with a higher spatial resolution might be needed for site-level planning of these specific ecosystems.

Many spatial data layers are freely available to the public through platforms such as Global Forest Watch, Mapbiomas, or other, often national, platforms. Given the importance of spatial data products for the screening of HCVs, the team might decide to engage with a service provider for the development of a tailored spatial product. e.g. a high-resolution land cover map, if the budget was available.

STAKEHOLDER CONSULTATION

Where screening is part of an ongoing jurisdictional planning process and a multi-stakeholder body has already been established, consultation (face-to-face or virtual[5]) with a wide range of stakeholders as part of the desk study may be relatively straightforward, whereas for a standalone screening the potential for consultation may be much more limited.

Consultation will normally be with government authorities, social and environmental NGO staff and other experts, and where possible should include representatives from landscape-level CBOs or indigenous organisations. It is important to document stakeholder engagement including:

- Name, organisation, expertise
- Category of stakeholder (e.g. government, NGO, CBO, biologist, social expert)
- Information shared and sought (e.g. did the team consult on data layers, a species list, likely livelihood and cultural values, social context, and risks?)
- Concerns raised and suggestions made

On-the-ground consultation, community engagement and participatory mapping are integral parts of the process of identifying social HCVs, identifying threats to those HCVs, and setting priorities for their management and conservation. Therefore, the more consultation that can be done during screening the further the process can progress, so facilitating the subsequent follow up.

[5] Useful information on how to run interactive virtual consultation sessions can be found in IUCN SSC CPSG (2020) A Guide to Facilitating Virtual Workshops. IUCN SSC Conservation Planning Specialist Group, Apple Valley, MN, USA: **http://www.cbsg.org/content/guide-facilitating-virtual-workshops**

STEP 1

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Sub-step 3A:

Use available information to identify potential HCVs

Sub-step 3B:

Identify indicators and cut-off points for HCV probability

Sub-step 3C:

Is mapping appropriate?

yes

Produce HCV probability maps

and

no

Produce tables, texts, lists, etc. on HCVs

STEP 5

Identify priorities in the landscape

Overlay (maps) or consider together (contextual information) probabilities and threats to determine where in the landscape to focus conservation and community engagement efforts. This step is essential for prioritising and planning interventions and next steps.

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STEP 3: CONSIDER POTENTIAL HCVS AND ESTIMATE PROBABILITY OF HCV PRESENCE

It is useful to break down Step 3 into a few sub-steps which consist of:

- Processing the available information and considering which HCVs may be present in the screening landscape – and making some initial groupings of different types of HCV within each of the six categories (from Figure 1).
- Considering how detailed the information is and whether it can be differentiated (e.g. spatially) across the landscape – this will lead to decisions about whether mapping is appropriate.
- Produce probability maps where relevant.

The generic sub-steps are described in more detail here, and then HCV-specific guidance and examples are provided in the sections below.

SUB-STEP 3A: USE AVAILABLE INFORMATION TO IDENTIFY POTENTIAL HCVs IN THE STUDY AREA

The different types of potential HCV (within each HCV category) are decided in sub-step 3A. For each of these types (e.g. HCV 4 riparian areas, HCV 1 savannah-dependent species) their probability of presence will be assessed in the study area. Annex 1 provides a list of potential data sources to consider and adapt depending on the context. Available information for the study area can point towards the presence or absence of specific HCVs. The information about potential HCVs does not necessarily need to be spatially differentiated, as information can come from reports, interviews or other data sources which point towards potential presence.

For example:

- IUCN species distribution lists can be used to identify RTE species that are potentially present in the study area (HCV 1).
- Local stakeholder interviews, or existing survey data, indicate that specific RTE species are present in the study area (HCV 1).
- Secondary literature and expert consultations highlight that forests are mostly fragmented, and that no intact forest landscapes (IFLs) overlap with the study area (HCV 2).
- An existing HCV NI identifies inselberg formations as a potential HCV for the country (HCV 3).
- Stakeholder interviews indicate that erosion is a widespread phenomenon in the landscape (HCV 4).
- A social NGO highlights that local communities in the study area rely on medicinal plants to treat certain diseases due to a lack of healthcare facilities (HCV 5).
- Scientific literature points towards the existence of sacred forests in the area (HCV 6).

SUB-STEP 3 B: IDENTIFY INDICATORS FOR EACH HCV AND CUT-OFF POINTS FOR PROBABILITY CLASSES

Next, from the available information about potential types of HCVs chosen in sub-step 3A, the team should search for indicators that would help to differentiate between probability levels within the study area.

For example:

- A land cover map is available for the study area, and the screening team decides to use 'large forest blocks', larger than 100 ha, as a proxy for forest-dependent RTE mammal species (HCV 1).
- A slope map and a land cover map are available for the study area, and the screening team uses forested areas with a slope of more than 30 degrees as an indicator for HCV 4.
- A hydrology layer is available for the study area, and the screening team considers a 30 m buffer surrounding any water body as an indicator of HCV 4.
- Stakeholders indicated that in most villages small altars are constructed as a place for worship. A layer indicating the location of villages is available for the study area, and the presence of a village is thus used as a strong indicator of HCV 6.

Annex 4 provides additional examples of indicators and probability classes for HCVs 1-4.

The screening team must consider if mapping is appropriate, i.e.: Does the available information allow for spatial differentiation in the study area? This may be the case for only a subset of the six HCVs. If it is not possible to differentiate between probability levels within the area (then, the answer to the question is NO), it will not be possible to define cut-off points. If very limited information is available, or it proves to be impossible to develop meaningful indicators, the screening team might decide to consider the probability of presence for a specific HCV or category of HCVs to be uniform across the study area, and if needed to apply the precautionary approach (Box 2). For example:

- The HCV NI mentions the existence of a specific forest type on calcareous soils within the country. Unfortunately, no soil maps are available for the study area and the screening team thus decides to apply the precautionary approach and consider this HCV 3 likely to be present in all forested areas in the study area.
- Contextual information pointed towards the presence of HCV 5 (medicinal plants) in the study area. There is however no further information on the exact location where these plants are collected, and the screening team decides not to produce maps for this value.

For these examples the team should discuss the probability of presence across the study area in a qualitative way and discuss how probability levels could be established in follow-up activities, e.g. by collecting more spatial information or participatory mapping.

If there are meaningful indicators and data is available, different probability levels across the study area can be shown on a map. Practitioners may combine several indicators, often extracted from different data sources, to define the probability classes of a specific HCV category in the study area. It is the screening team's responsibility to decide how indicators will be combined, which thresholds will be used for each of the indicators, and what the 'decision rule' is for establishing the probability levels. In all cases a justification for these criteria, ideally based on trustworthy references, should be provided in the report.

While some practitioners find it helpful to present the decision rule for the probability of presence of a specific HCV category in tabular format, others prefer to illustrate this using a flowchart representing a decision tree. Figure 3 is an example decision tree, where local stakeholders have indicated that some forest-dependent RTE faunal species are present in the study area (sub-step 3A), and the decision tree provides rules for differentiating between high, medium, and low levels of probability of presence of these species within the study area based on land cover information.

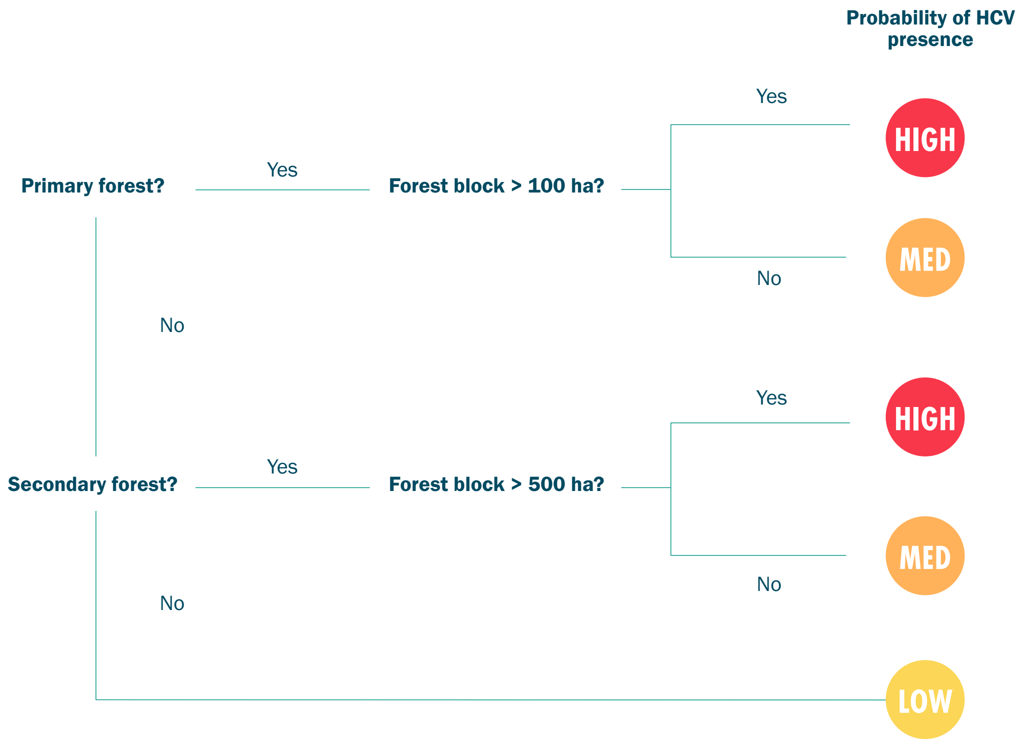


Figure 3. Example decision tree to determine probability of presence for forest-dependent RTE faunal species in the study area based on land cover information.

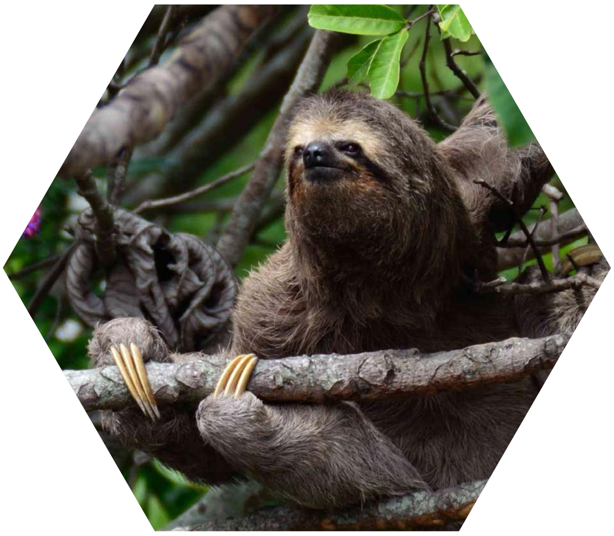
SUB-STEP 3C: IF MAPPING IS APPROPRIATE, PRODUCE PROBABILITY MAPS FOR HCV PRESENCE

Based on the available spatial information and the identified indicators and cut-off points, HCV probability maps can be developed. Many practitioners find it useful to produce multiple maps for each HCV, for example, they might prepare a probability map for HCV 4 – erosion control and HCV 4 – riparian buffers. Overall or combined probability maps can also be produced for each HCV category, but these are probably most useful for illustration purposes or to provide a rough estimate of total HCV areas within the study area. Instead results should be tailored to each of the HCV groups or features identified and therefore separate maps for different HCV groups or features is more meaningful.

1

HCV 1 | SPECIES DIVERSITY

Concentrations of biological diversity including endemic species and rare, threatened or endangered species, that are significant at global, regional or national levels.



OVERVIEW OF HCV 1

HCV 1 covers significant concentrations of biological diversity, recognised as unique and outstanding, in comparison with other areas. Concentrations of biodiversity may be significant at global, national and/or subnational levels. Rare, threatened and endangered (RTE) species refers to species that are at risk of undergoing or have undergone population decline. Endemic species are those found within a restricted geographic region. There are different ways to interpret “rare” species including:

***Anthropogenically* rare species:** Many of these species were once common across larger tracts of forests or other natural ecosystems. The main reasons they are now RTE, is that their once wide expanses of habitat have been converted and fragmented through clearing (e.g. for logging, agriculture and pasture), and/or that their numbers have been severely reduced by overhunting, intensive collecting or logging. The strong association between species and ecosystems means that remaining tracts of these ecosystems may be used as proxies for species presence. For species that are targeted for hunting, collection, and logging; proximity to human settlement would be a factor in determining the probability of presence.

***Naturally,* rare species:** Some potential HCV 1 species are specialists linked to spatially restricted locations, e.g. sites or patches of habitats or ecosystems. Such sites or ecosystems can often be mapped; even when the species data layer may not be available for the whole landscape. Species requiring habitats that are too localised to be detected at the landscape should be assessed during subsequent site-level work.

SUB-STEP 3A: IDENTIFY ANY HCV 1 THAT MIGHT BE PRESENT IN THE STUDY AREA BASED ON AVAILABLE INFORMATION

As a first step, a list of potential HCV 1 species for the study area should be developed. Most HCV NIs include guidance on what species and species assemblages are considered possible HCVs, and under which circumstances. Where no such guidance exists, it is precautionary to treat all nationally protected species, as well as those listed as threatened (VU, EN and CR) on the IUCN Red List, National Red Lists and in CITES Appendix lists, as candidate HCV 1 species. Endemic species are typically covered under the IUCN Red List classification system and/or designated on nationally protected species lists, so may be considered as subsets of these. Consultation can help confirm information and identify additional information sources.

As several potential HCV 1 species might occupy similar ecosystems, it can be useful to group species according to the habitat they occupy, e.g. forest- versus savannah-dependent species. It might also be relevant to further differentiate between species. For example, if management recommendations would differ between fauna and flora species, or between specific groups of fauna species (e.g. mammals versus birds), the screening team might consider them separately at this point in the screening. The result of sub-step 3A would be a few (or several) HCV 1 types or groupings e.g. forest-dependent flora species, that are potentially present in the study area. With each of these HCV 1 types or groupings, a list of species is associated, and these should be included in the results, e.g. in a report annex.

SUB-STEP 3B: IDENTIFY HCV 1 INDICATORS AND CUT-OFF POINTS FOR PROBABILITY CLASSES

For each of the above species groups, a set of indicators should be defined to assess the likelihood of this group being present. Examples of information that can be used to indicate presence of HCV 1 include:

- Information on species habitat preference matched to land cover and land use maps
- Location of anthropogenic activities (e.g. settlements, roads, plantations, etc.) – e.g. to estimate where species are less likely to be present
- Location of protected areas
- Information on habitat preferences overlaid with ecosystem maps
- 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 subsequently mapped at the site-level.
- Existence of (large-scale) features which may support temporal concentrations of biodiversity (e.g. mud flats, wetlands)

For each of the species or species groups the team decides if it is possible to develop probability levels that differ within the study area. For example, habitat quality, the size of habitat patches and spatial arrangement are all important in maintaining diversity, particularly for RTE species. Larger and better-connected patches are more ecologically viable than smaller, isolated patches. Therefore, for forest-dependent HCV 1 species, indicators can be based on extent of forest land cover, forest patch size, and proximity to larger intact forest ecosystems. Widths of forest corridors can also be used as an indicator of lower or higher HCV probability for forest-dependent HCV 1 species. The screening team might decide to identify cut-off points to further differentiate between probability classes, e.g. forest patches larger than 1,000 ha would point towards higher probability, while patches with an area between 100 and 1,000 ha might point towards medium probability.

If limited information is available, e.g. on the location of wide-ranging faunal species, the screening team might decide to consider their probability of presence to be uniform across the study area. For example: The whereabouts of wide-ranging HCV 1 faunal species shift over time and cannot be pinpointed with the same precision as plant species or more sedentary animal species closely linked to certain sites and habitats. Thus, a precautionary assumption is that wide-ranging faunal species are likely to be present in all their historic distribution range unless there are strong indications to the contrary.

Table 1. Examples of how cut-off points can be established or how indicators can be combined to make a decision rule about probability of presence.

Low or lower probability of HCV 1	High or higher probability of HCV 1 If one or more of these are present in the landscape, to be determined by decision rules
• Natural forest (or other habitat) patches of a smaller size (to be defined) • Highly modified and/or polluted areas • Heavily degraded habitat • Agriculture and monoculture plantations (which do not provide connectivity) • Remnant natural forest (or other habitat) patches of a small size (to be defined) that do not provide a connectivity function	• IUCN species range maps overlap with landscape • Floral and faunal studies with accurately mapped species distributions, supported by expert opinion • Presence of one or more individuals of IUCN Red List critical (CR) species • Presence of X nationally protected, Red-Listed, or endemic species • Accurately mapped suitable habitats (of adequate size) for species that are habitat-specialists • Habitat matrix that is suitable for wide-ranging species • Large intact ecosystems • Areas that may be important for large-scale ecological connectivity • Regenerating (degraded) forest areas that do not appear as forest in the land cover map, but overlap with known distributions of species that are CR, EN or VU species on the IUCN Red List where the species' distribution has been mapped in finer detail • Natural forest patches of a certain area (to be defined), with buffer • Protected Areas with buffer • Conservation priority areas (e.g. KBA) • Connectivity corridors and stepping stones between large blocks of forests, even where forest quality is heavily degraded • Rivers and associated riparian forests (especially where forest of a certain width (to be defined) is present on either side of a river)

Table 2. Example of indicators of groupings of HCV 1 (e.g. group of primates) and proxies (e.g. forest patches) and how they can be used to assign probability levels for HCV presence.

Criteria	Indicator (values/attributes)	Higher Probability	Lower Probability	Data Source (numbers referring to references in report annex)
Centers of high biodiversity areas, such as protected/ conservation areas that are natural forest	Protected areas, i.e. conservation areas and protection forest	KBA (Key Biodiversity Area); National Park, Protection Forest with natural forest cover	Protection Forest with non-forest cover	1,2,8,9
Flagship species –CR (Red-list) on landscape scale: Orangutan (Pongo pygmaeous) Considered with habitat: **Forest area as viable habitat for flagship species (Orangutan)**	Viable population requires 125 – 1000 km² of suitable habitat in Borneo 250 ha minimum patch size threshold, at the lower end of the best estimate of minimum home range size of female P. pygmaeus wurmbii in Sabangau	Patch size of natural forest cover of ≥12,500 ha	Patch size of natural forest cover of ≥250 ha and <12,500 ha	1,10,11,12
Concentrations of RTE species (IUCN CR and EN species)	Overlapping distributions of several IUCN-CE/EN mammal species (Pongo pygmaeus, Presbytis chrysomelas, Manis javanica, and Hylobates muelleri)	All-natural forest cover	All non-forest natural vegetation (shrubs)	1, 10
Forest patches that functions as corridors – as biodiversity support	Forest patches with core area of minimum 10 ha, and distance between patches of < 200 m apart, excluding the protected area/ protection forest	Natural forest cover with core area of >100 ha with <200 m apart	Natural forest cover with core area of 10-100 ha with <200 m apart	1,3
Riparian forests that function as temporary habitat	Any natural forest or vegetation under the definition of riparian forest/vegetation	Riparian area with natural forest cover	Riparian areas with non-forest natural vegetation cover (e.g. shrubs)	1, 6

SUB-STEP 3C: PRODUCE HCV 1 PROBABILITY MAPS

The HCV 1 groupings that were chosen in sub-step 3A, and for which there is information available to differentiate between probability levels within the study area, can now be mapped. Depending on the quality and detail of data, screening teams can produce maps for individual species or for assemblages of species or HCV 1 types. It might be relevant to differentiate based on differences in how the different HCV 1 groupings are affected by threats[6], even if they belong to the same assemblage, e.g. forest-dependent mammals versus forest-dependent plant species. The first ones might be affected by hunting, so creation of alternative protein sources might be potential next steps, the second one by overharvesting of NTFPs – which would need a different strategy. This is not necessary, but it helps when presenting the results.

If appropriate, an overall HCV 1 probability map can be produced by overlaying all HCV 1 probability maps. Where different probability classes overlap in a given area (e.g. an area has lower probability of species A but higher probability of species B), the precautionary approach would advise opting for the highest probability class in the area in question as the overall HCV 1 probability.

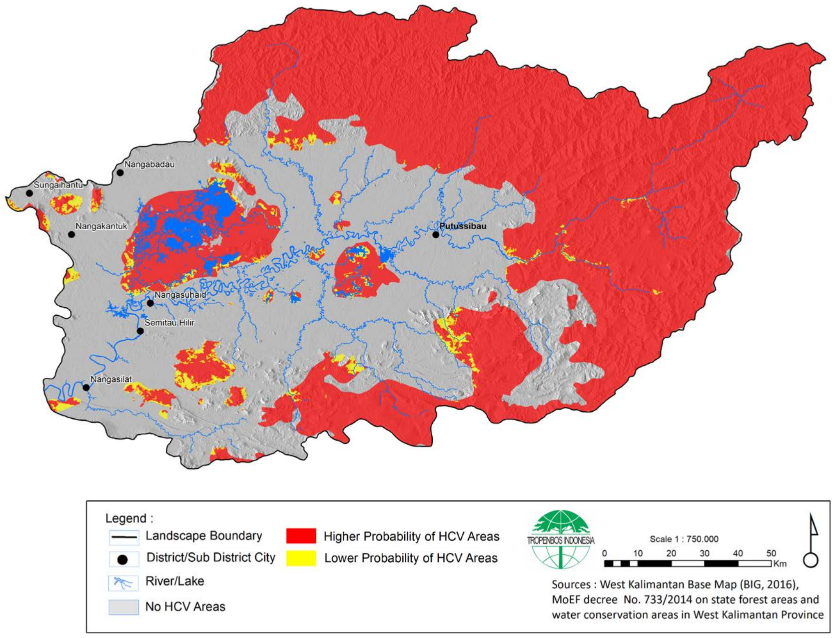


Figure 4. Probability of presence for HCV 1 - Centres of High Biodiversity
This map shows the probability of presence for HCV 1 (centres of high biodiversity - protected areas and KBAs) in Kapuas Hulu District. The grey areas marked 'no HCV' - refer to an absence of evidence for centres of high biodiversity.

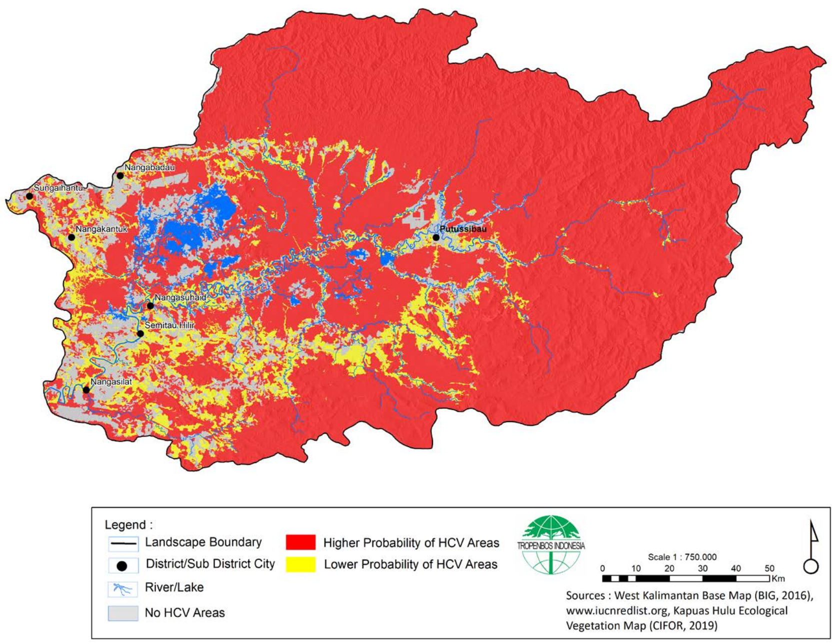


Figure 5. Probability of presence for HCV 1 - Concentrations of RTE species
This map shows the probability of presence for HCV 1 (concentrations of RTE species) in Kapuas Hulu District. The RTE species are represented by four species of primates (Pongo pygmaeus, Presbytis chrysomelas, Manis javanica, and Hylobates muelleri): . The grey areas marked 'no HCV' - refer to an absence of evidence of presences of those four primate populations.

[6]Threats are discussed in Step 4, but this kind of information will already be known to the screening team after the information gathering step – and therefore it is relevant to mention here.

HCV 2 | LANDSCAPE-LEVEL ECOSYSTEMS, ECOSYSTEM MOSAICS AND IFL

Large landscape-level ecosystems, ecosystem mosaics and Intact Forest Landscapes (IFL) that are significant at global, regional, or national levels, and that contain viable populations of the great majority of the naturally occurring species.

OVERVIEW OF HCV 2

HCV 2 areas are generally large (>50,000 ha has been widely used as a guideline, but this should be determined by an HCV NI or expert consultations), but smaller areas may also qualify, especially where a connectivity function is played.

SUB-STEP 3A: IDENTIFY ANY POTENTIAL HCV 2 IN THE AREA

For HCV 2, there are two key aspects to consider, namely extent/size of the ecosystem and whether or to what degree an area is a natural ecosystem or not. Identification (and often mapping) of HCV 2 forest is relatively straight forward since use of IFL, large intact forest land cover, and ecoregions can be used as direct indicators of HCV 2 forest ecosystems. By contrast, because semi-open and open ecosystems such as savannahs, grasslands and wetlands often lack structurally defining features that can be readily identified remotely, use of other information may be needed to identify their presence. In this case, references on land cover, ecosystem types or soil types can be useful.

A very low level of human impact is not necessarily the best indicator of HCV 2 – as grassland and woodland values may be created and maintained by human practices such as harvesting of fodder, regular burning, or moderate livestock grazing. However, proxies may be designed based on a time series of photos, on the assumption that open grassland (not created by deforestation over the last couple of decades) may have a long history and harbour high biodiversity values. Valuable (undrained) wetlands may be addressed through similar time series approaches.

The result of sub-step 3A is a list of HCV 2 categories, e.g. IFLs and large wetland ecosystems, that are potentially present in the study area.

SUB-STEP 3B: IDENTIFY INDICATORS AND CUT-OFF POINTS FOR PROBABILITY CLASSES

For each of the HCV 2 types, a set of indicators should be defined to assess the likelihood of this type of HCV 2 being present. Some examples of potential HCV 2 features include:

- IFL
- Ecoregions
- Land system or soil type
- Protected areas, national park, etc.
- Global ecosystem data sets

For each of the HCV 2 types it will be assessed if it is possible to develop probability levels that differ within the study area. For example, in a lowland rainforest landscape, secondary forest areas where selective logging used to take place may still hold much of the natural values of a lowland rainforest ecosystem; but in other areas where forest has been converted for agricultural plantation and settlements, it is obvious that the area in question would have lost its natural values and therefore cannot be identified as a naturally functioning ecosystem. Land use and presence of anthropogenic features (e.g. location of settlement, road, concession, etc.) is also useful to assess the presence of large natural ecosystems.

Cut-off points between HCV 2 probability classes should be determined based on qualities like size, and level of intactness. For example, within an IFL, certain areas may be severely degraded while the rest are still intact based on the land cover classification. Probability of HCV 2 presence in the degraded part of the IFL in that example may fall into the lower probability class or even be confirmed as absent, depending on how severe the degradation is. In this case, the decision rule for placing some areas of the IFL in a lower probability class for HCV 2 is: HCV 2 is considered absent if the area of HCV 2 proxy is converted to other land uses or severely degraded. In some cases, the screening team may adopt a precautionary approach, to say severely degraded areas within a certain distance from a large forest ecosystem may classify as lower probability of HCV 2 when the degraded area is very small and surrounded by relatively intact forest so that recovery is highly possible.

Table 3. Examples of how cut-off points can be established or how indicators can be combined to make a decision rule about probability of presence.

Low or lower probability of HCV 2	High or higher probability of HCV 2
• Semi-open and open ecosystems such as savannahs, grasslands, and wetlands where overall extent is less than e.g. 50,000 ha and there are indications that the level of intactness has been significantly reduced. • Large ecosystems with high levels of fragmentation and/or degradation. • Long history of forest/land fire. • Indications of agricultural activities. • Presence of remnant forest/young regenerating forest patches. • Large ecosystems where there has been a reduction and/or disappearance of multiple species and/or species groups • Production forest status from national land use designation. • Indications of extensive logging activity from remote sensing (e.g. indications of logging tracks in the forest and operational roads).	• IFLs • Ramsar sites • Large intact ecosystems e.g. > 50,000 ha (or national threshold), or a mosaic of ecosystems of a similar size • Large wetlands • Areas where large blocks of forests or other ecosystems (e.g. <50,000 ha) are connected by corridors and stepping stones, though not highly fragmented • Connectivity corridors and stepping stones between large blocks of forests or other ecosystems • Habitats of large wide-ranging species / top predators • Few indications of historical forest exploitation. • Strong indications of customary forest status (located in indigenous community area).

Table 4. Example of indicators of groupings of HCV 2 and how they can be used to assign probability levels for HCV presence.

Criteria	Indicator (values/ attributes)	Higher Probability	Lower Probability	Data Source (numbers referring to references in report annex)
Large Intact Forest (following the HCV Toolkit Indonesia, 2008)	Large Intact Forest >20,000 ha	Most recent IFL map	Older IFL map	7
Wetland ecosystem (ecosystem transition between wetland and dry-land areas)	Peatland ecosystem and mineral swamp ecosystem	Area under definition of wetlands, with natural forest cover area	Area under definition of wetlands, with non-forest natural vegetation (shrubs)	1, 6

SUB-STEP 3C PRODUCE HCV 2 PROBABILITY MAPS

The HCV 2 groupings that were chosen in sub-step 3A, and for which there is information available to differentiate between probability levels within the study area, can now be mapped.

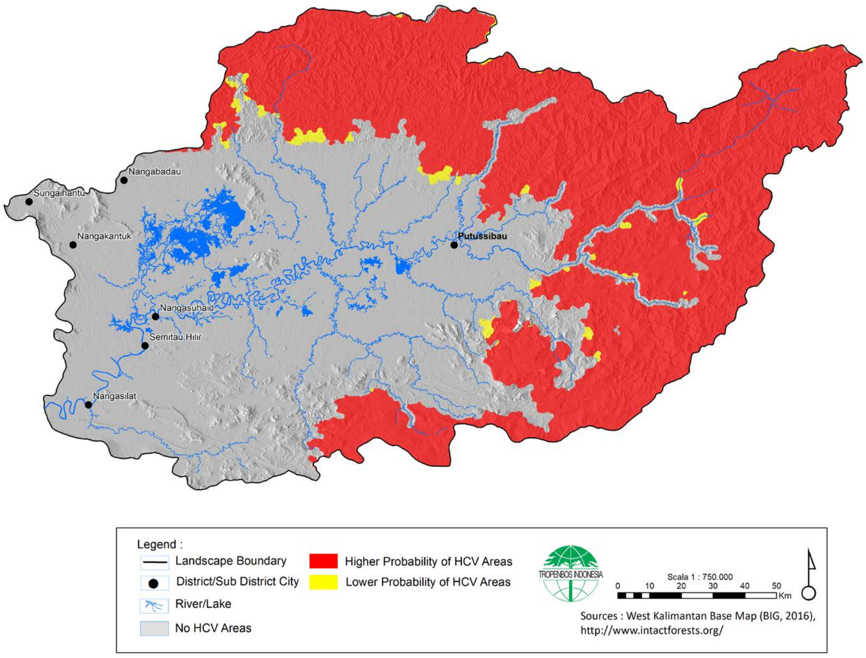


Figure 6. Probability of presence for HCV 2 - Intact Forest Landscapes

This map shows the probability of presence for HCV 2 (Intact Forest Landscapes) in Kapuas Hulu District. The grey areas marked 'no HCV' - refer to an absence of evidence for IFLs.

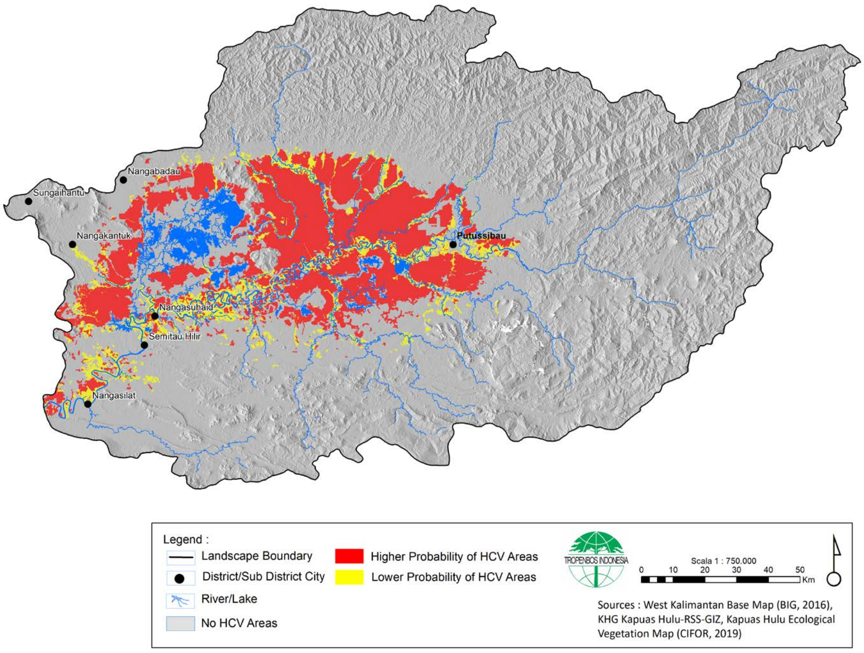


Figure 7. Probability of presence for HCV 2 - Wetland ecosystems

This map shows the probability of presence for HCV 2 (wetland ecosystems) in Kapuas Hulu District. The grey areas marked 'no HCV' - refer to an absence of evidence for wetland ecosystems.

HCV 3 | ECOSYSTEMS AND HABITATS

Rare, threatened, or endangered (RTE) ecosystems, habitats or refugia.

OVERVIEW OF HCV 3:

HCV 3 includes RTE ecosystems, habitats, or refugia. Ecosystems are a dynamic complex biological and environmental feature interacting as a functional unit which can be identified using vegetation classifications and physical environmental features such as substrate (e.g. soil type or land system), climate, topographic features, etc. Habitat, which is the place where a population or organism occurs, may be synonymous with the definition of ecosystem or be defined at a smaller scale. Refugia can be defined as areas where populations or certain species can occur – which is often influenced by factors such as e.g. anthropogenic threats, climatic events, invasion of exotic species, etc.).

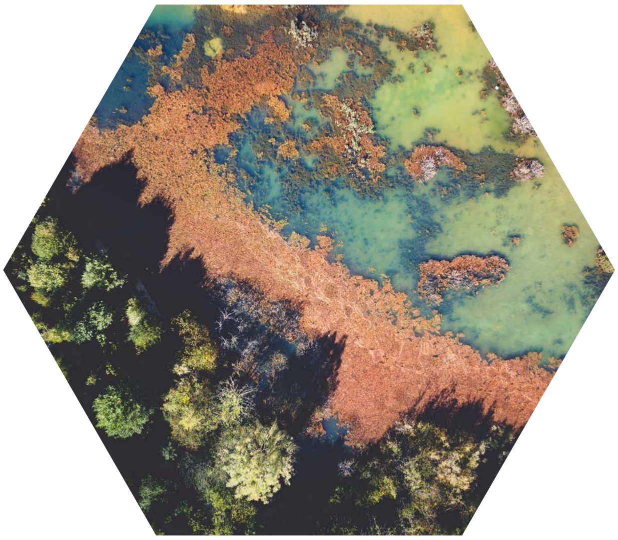
SUB-STEP 3A: IDENTIFY HCV 3 THAT ARE POTENTIALLY PRESENT IN THE STUDY AREA

Contextual information should be consulted to identify RTE ecosystems, habitats or refugia that are potentially present in the study area. The main factor for determining which areas of natural ecosystem in the landscape would qualify as HCV 3 is based on its rarity and/or level of possibility of its continued existence in the future. The following are conditions of an ecosystem that would qualify as HCV 3:

- Naturally rare because they depend on highly localised soil types, locations, hydrology, or other climatic or physical features such as some types of limestone karst forest and inselbergs.
- Anthropogenically rare because the extent of the ecosystem has been greatly reduced by human activities compared to their historic extent.
- Threatened or endangered due to current or proposed operations.

A potential data source for this purpose is the IUCN Red List of Ecosystems, which provides a global framework for assessing ecosystem risk (CR, EN, VU, etc.). Another global dataset that can be used is the WWF Terrestrial Ecoregions of the World database. Where available, the use of HCV NIs and National FSC Frameworks, which often list country-specific rare or endangered ecosystems, might be helpful. However, HCV NIs vary in the level of detail provided on endangered ecosystems, often due to data paucity at the national scale, and the challenge of setting clear thresholds. Therefore, it is important to identify data gaps and weaknesses, and consider that in regions where land use change has been rapid and/or land use plans have recently been elaborated or updated, the status of RTE ecosystems may have changed.

While the above data sources are useful to identify naturally rare HCV 3 types, the identification of anthropogenically rare ecosystems needs information on the former extent of these ecosystems, and to what extent they have been reduced by human activities. Information on potential anthropogenically rare ecosystems can often be acquired from (in-country) experts. Another way of identifying anthropogenically rare ecosystems is by defining a threshold that would qualify the ecosystem as rare (e.g. area-based loss of cover against an agreed baseline, or actual extent being less than a given representational target), and identify those ecosystems that would qualify using actual (and historic, if a trend analysis would be needed) land cover classifications.



Consultation with experts can also help identify localised features and associated habitats, that occur at too fine a resolution to be detected by satellite imagery.

The result of this sub-step is a list of HCV 3 categories, e.g. different rare ecosystem types, that are potentially present in the study area.

SUB-STEP 3B: IDENTIFY HCV 3 INDICATORS AND CUT-OFF POINTS FOR PROBABILITY CLASSES

For each of the HCV 3 types that are potentially present in the study area, indicators should be chosen to differentiate between the probability of presence of the HCV 3 type within the study area.

The following spatial data sources can be useful to identify features that indicate potential presence of naturally rare HCV 3 types:

- Geology and soil maps
- Topographic maps
- Slope maps (if needed derived from altitude layers)
- Hydrology layers
- Vegetation classifications or land cover analyses. If no detailed vegetation classification map is readily available for the study area and if the budget would allow for this, the screening team might commission the development of such a map for the identification of specific HCV 3 types.
- Climate maps (for larger study areas)

While the presence of one or more indicators might point towards a high likelihood of, or even confirmed, presence of HCV 3 types, the screening team might consider including a ‘medium probability class’, e.g. by establishing a buffer surrounding specific biophysical features, to capture any uncertainties and mapping inaccuracies related to the reference indicator information.

Due to a lack of accurate spatial information it is often challenging to assess the probability of presence of specific HCV 3 types within the study area. For example, while HCV 3 ecosystems are often associated with specific soil types, publicly available soil maps are mostly of rather coarse resolution and would not allow differentiating between probability levels for HCV 3 presence within the study area. In these situations, the screening team might have to conclude that the probability of presence should be uniform for the entire study area and assign a probability class considering the precautionary approach.

Table 5. Examples of how cut-off points can be established or how indicators can be combined to make a decision rule about probability of presence.

Low or lower probability of HCV 3	High or higher probability of HCV 3
• Areas where RTE ecosystems were identified in the past, but where land-use change, and loss of natural vegetation has occurred. • Ecosystem or vegetation classes that are difficult to identify and map using remote sensing and modelling, therefore mapping and assessing threat is approximate e.g. mixed rubber versus natural forest.	• Ecosystems that are: » naturally rare and highly localised. » anthropogenically rare, with a current extent that is significantly reduced compared with its historic extent due to human activities. » endangered or threatened and rapidly declining and/or degenerating due to human activities. » heavily fragmented relative to their original extent. » poorly or partially represented within protected areas in the 'wider landscape'. • Nationally identified RTE ecosystems, that are still in their natural or historical condition E.g. mangroves, wetlands, montane ecosystems, peatlands • PAs and other protected designations (Ramsar sites, KBAs) • RTE Ecosystem or vegetation classes that have been or can be accurately identified or modelled using imagery and/or geophysical features

Table 6. Example of indicators of groupings of HCV 3 and how they can be used to assign probability levels for HCV presence.

Criteria	Indicator (values/ attributes)	Higher Probability	Lower Probability	Data Source (numbers referring to references in report annex)
RTE ecosystem under national definition	RTE ecosystem as defined by the HCV Toolkit Indonesia, 2008	RTE ecosystems, that are still with their natural condition/ with natural forest cover	RTE ecosystems, that were with their natural condition/ natural forest cover in the past, but where land-use change, and loss of natural vegetation has occurred	1,6,14

SUB-STEP 3C: PRODUCE HCV 3 PROBABILITY MAPS

The HCV 3 types or groupings that were chosen in sub-step 3A, and for which there is information available to differentiate between probability levels within the study area, can now be mapped.

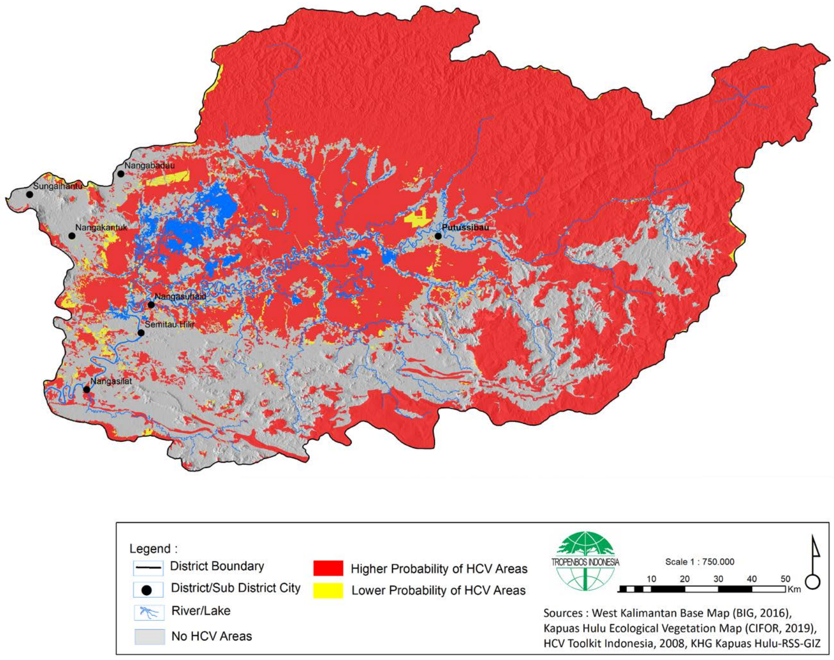


Figure 8. Probability of presence for HCV 3 - RTE ecosystems
This map shows the probability of presence for HCV 3 (RTE ecosystems) in Kapuas Hulu District. The grey areas marked 'no HCV' - refer to an absence of evidence for RTE ecosystems.

HCV 4 | ECOSYSTEM SERVICES

Basic ecosystem services in critical situations, including protection of water catchments and control of erosion of vulnerable soils and slopes.

OVERVIEW OF HCV 4:

HCV 4 is about ecosystems services, which can be classified as environmental values, but HCV 4 is also considered a part of the human or social conservation values as it carries an implication that the ecosystem services are critical to someone – a village, community or social group. An ecosystem service is considered critical if disruption of that services poses a threat of severe, catastrophic, or cumulative negative impacts on welfare, health, or survival of local communities[7], on the functioning of important infrastructure or other HCVs.

Local HCV 4 includes water supplies that are critical for e.g. drinking water, cooking, washing and, fishing, and where there are no viable or readily available alternatives. It also includes areas important for prevention of erosion on vulnerable soils and slopes where such erosion would have a critical impact on people e.g. reducing the area of productive lands and increasing sediment loads, which causes siltation of water bodies and irrigation channels. This is particularly important for farming and fishing communities.

Larger-scale HCV 4: HCV 4 may apply to river and stream regulation in natural catchments where these water supplies are critical for human uses and where there are no viable or readily available alternatives. HCV 4 occurs in areas that contain natural vegetation types (e.g. forest or native grasslands) in good condition that help to prevent erosion, landslides gullying, dust storms and desertification, where such events would have a critical impact on people or the environment. Such impacts might be catastrophic (landslides) or pernicious and difficult to reverse (gradual loss of soil fertility and land productivity).

SUB-STEP 3A: IDENTIFY HCV 4 THAT ARE POTENTIALLY PRESENT IN THE STUDY AREA

Sub-step 3A would allow the identification of potential HCV 4 in the area, by drawing on relevant information sources such as:

- Information on community livelihoods
- National critical watershed maps, indicators, and guidance
- National erosion risk maps, indicators, and guidance
- Critical infrastructure maps (such as major transport routes, reservoirs, hydroelectric dams etc.)

The screening team can consider questions such as:

- Is erosion an issue? If so, there is potentially HCV 4 vegetation on steep slopes.
- Do people depend on water bodies for drinking water? If so, there is potentially HCV 4 riparian areas.
- Are there any mangroves or estuary ecosystems in the study area? If yes, they can possibly be considered as an HCV 4 because they provide important ecosystem services for downstream communities (e.g. protection from extreme waves and tidal floods, and provision of fishes as a source of protein and/or income).

[7] This is a limitation of the screening exercise since local consultations are not feasible in most of the cases. Probability of HCV 4 presence should be verified through ground truthing and participatory mapping and consultation with communities during follow-up activities.

In general, where there are human populations (e.g. settlement, city, etc.) in the area of influence of hydrological regulation (e.g. river, hill or mountainous area, coastal area, major wetland, etc.), it can be assumed that all environmental features that constitutes the natural hydrological regulation would qualify as HCV 4. But the reverse can also occur: For instance, when indications of human populations are not found in the landscape (e.g. isolated or uninhabited area), one may classify rivers and forest riparian zones as low probability of HCV 4 because the probability of HCV 4 presence depends on the capability of an ecosystem service in a landscape to provide those services for humans.

In cases where indications of human populations are found distributed across the landscape and HCV 4 proxies are found to be degraded, the screening team should consult with experts and local stakeholders to derive more specific information.

The result of this sub-step is a list of HCV 4 categories, e.g. vegetation on steep slopes, vegetation that serves as firebreaks, upstream forest providing water to communities, etc.

SUB-STEP 3B: IDENTIFY HCV 4 INDICATORS AND CUT-OFF POINTS FOR PROBABILITY CLASSES

For each of the categories of HCV 4 assembled in sub-step 3A, the team should consider differences in probability of presence within the study area. The information types listed here would typically be used for that purpose.

- Land cover and land use classification
- Settlement locations
- Indications of hydrological events (e.g. extent of flooding, river meandering zone, etc.) from satellite imagery
- Hotspot spatial and temporal distribution (National fire risk/fire incidence maps)
- Topographic information
- Watershed area
- River network and riparian zone
- Lakes and other water body buffer zone
- Coastline and mangrove zone
- Steep area and hill complexes
- Soil type or land system
- Nationally recognised areas important for hydrological function
- Wetlands
- RAMSAR sites
- Standard width for riparian zones can be used for mapping of river and riparian zones as potential HCV 4
- Spatial/temporal distribution of rainfall
- Areas for the protection of local water catchments, water filtration, protection against storms, coastal protection, prevention of fires and control of erosion of vulnerable soils and slopes. Some of these features will be captured through broader-level mapping for ecological HCVs but some local aspects can only be identified through local engagement.

Screening should cover probability estimation of degraded and/or damaged environmental features that once provided or could provide certain ecosystem services (e.g. deforested/cleared steep area, riparian area converted to agriculture, etc.). Using a precautionary approach, those areas can be identified as low probability of HCV 4 though they may have partially lost their nature (e.g. natural land cover) or their function as a provider of ecosystem service.

Cut-off points for probability classes can be arrived at by establishing critical risk criteria (e.g. fragile soil types, slope limits for operations, watershed protection legislation) based on national standards, local consultation, and expert knowledge.

Table 7. Examples of how cut-off points can be established or how indicators can be combined to make a decision rule about probability of presence.

Low or lower probability of HCV 4	High or higher probability of HCV 4 (if these features would help maintain ecosystems services for people)
• Degraded and/or damaged environmental features that once provided or could provide certain ecosystem services (e.g. deforested/cleared steep area, riparian area converted to agriculture farm, etc.) • Medium slopes • Very small seasonal flow of water that occurs only at the peak of rainfall • Seasonal water reservoir • Steep area with a very small extent • Artificial dam or reservoir • Small/narrow artificial water channel as barrier for potential spread of forest or land fire	• Areas important for the prevention of erosion and sedimentation • Steep slopes (defined by national regulations or stricter) which are covered in vegetation • Upstream forest (source and transition zones of water catchments) • Areas that function as natural barriers to the spread of forest or ground fires • Rivers, lakes, waterbodies, wetlands, and immediate buffer zones • Areas or ecosystems important for the provision of water and prevention of flooding for downstream communities e.g. coastal, riparian and flood plain forests, peat swamp forests and peatlands, freshwater swamp forest • Known presence of important pollinators and/or pollinator habitat – where pollination is critical for communities' livelihoods

Table 8. Example of indicators of groupings of HCV 4 and how they can be used to assign probability levels for HCV presence.

Criteria	Indicator (values/ attributes)	Higher Probability	Lower Probability	Data Source (numbers referring to references in report annex)
Ecosystems important for: 1) the provision of water in upstream areas and 2) as flood prevention in the downstream areas (for communities)	Rivers, lakes and wetland ecosystem	Wetland ecosystem with natural forest cover	Wetland ecosystem with natural shrubs cover	1,3,6
	Water catchment area with altitude of > 500m asl	Water catchment area with altitude of > 500m asl, with natural forest cover	Water catchment area with altitude of > 500m asl, with non-forest cover	1,4,16
Important area for the prevention of erosion and sedimentation	Steep slope areas of > 40%	Steep slope areas of > 40% with forest cover	Slope areas of 25- 40% with forest cover	1,4
Natural ecosystems or features that function as firebreaks	- Rivers, lakes and wetland ecosystem (including peat swamp) - Intact natural forest	- River with ≥ 50m width - Perennial lake - Intact primary forest (including peat swamp)	- River < 50 m width - Seasonal lake - Intact secondary forest - Swamp areas	1,3,6

SUB-STEP 3C: PRODUCE HCV 4 PROBABILITY MAPS

For each of the HCV 4 types identified in sub-step 3A, a probability map can be produced.

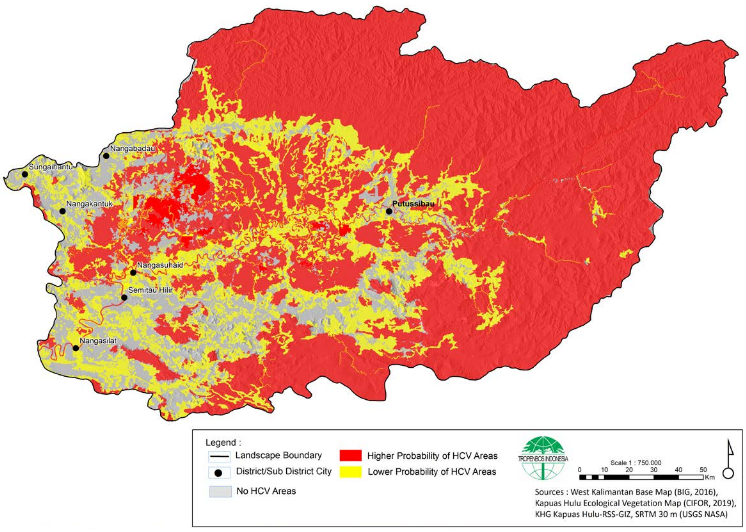


Figure 9. Probability of presence for HCV 4 - Vegetation or water bodies that serve a firebreak function

This map shows the probability of presence for HCV 4 (firebreaks) in Kapuas Hulu District. The grey areas marked 'no HCV' - refer to an absence of evidence for firebreaks.

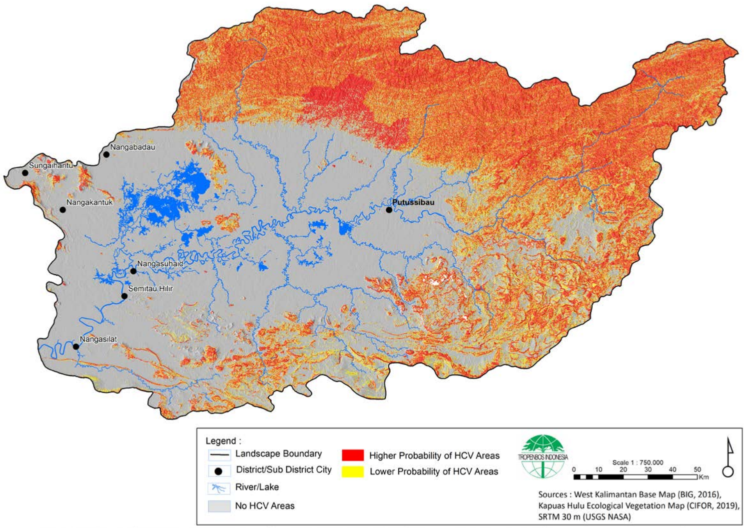


Figure 10. Probability of presence for HCV 4 - Vegetation that prevents erosion

This map shows the probability of presence for HCV 4 (prevention of erosion) in Kapuas Hulu District. The grey areas marked 'no HCV' - refer to an absence of evidence of vegetation that would prevent erosion.

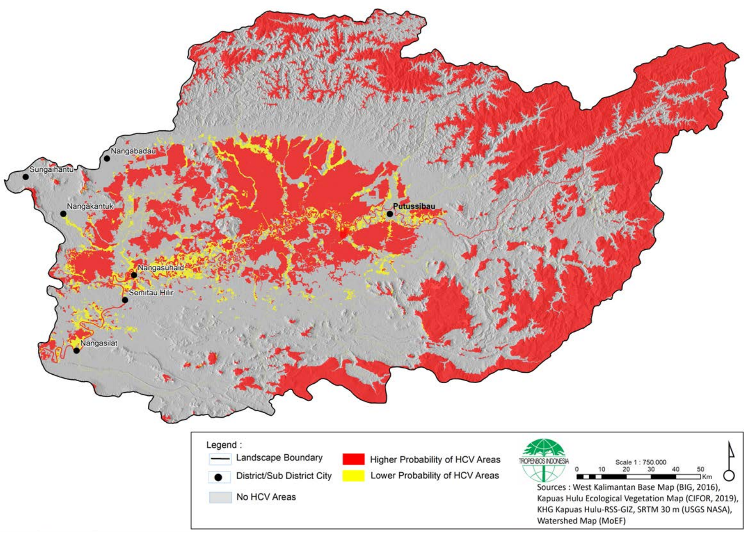
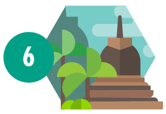


Figure 11. Probability of presence for HCV 4 - Water provision

This map shows the probability of presence for HCV 4 (water provision) in Kapuas Hulu District. The grey areas marked 'no HCV' - refer to an absence of evidence of water provision services for people.

HCV 5 | COMMUNITY NEEDS

Sites and resources that are fundamental for satisfying the basic necessities of local communities or indigenous peoples (for livelihoods, health, nutrition, water, etc...), identified through engagement with these communities or indigenous peoples.



HCV 6 | CULTURAL VALUES

Sites, resources, habitats and landscapes of global or national cultural, archaeological or historical significance, and/or of critical cultural, ecological, economic or religious/sacred importance for the traditional cultures of local communities or indigenous peoples, identified through engagement with these local communities or indigenous peoples.

OVERVIEW OF THE SOCIAL HCVS

HCVs 5 and 6, together with local aspects of HCV 4 above, are called the social HCVs because they refer to values of the environment for people. They are concerned with local supporting and regulating services (HCV 4), provisioning services related to livelihood needs (HCV 5), and cultural services (HCV 6). The social HCVs are also referred to as local HCVs, because (other than certain aspects of HCV 6) they are concerned with locally held values that must be identified through engagement with local communities and indigenous peoples and with their FPIC.

HCV 5 includes species, landscape features and land use types that are essential for livelihoods. The screening report should therefore summarise available information on the livelihoods of different subgroups of the rural population and identify livelihoods components that are known to be essential and /or in short supply. This information can be presented in text or in a table with rows for different subgroups and values (such as different ethnic groups and / or communities with different levels of integration into the market economy).

The definition of **HCV 6** is extremely broad, and it is useful to divide it into two categories: values of critical importance for local people and values of global or national significance. Local HCV 6 values may include religious or sacred landscape features such as mountains, lakes, forests, rivers and waterfalls, burial grounds, sites at which traditional ceremonies take place, and / or plant or animal resources with totemic values or used in traditional ceremonies. Individual sites cannot be detected without in-depth engagement with the communities, but it may be possible during the screening process to list what kinds of values are likely to be present in the landscape as a whole, and potentially in different subunits of the landscape, based on the presence of different ethnic groups and religious faiths and information on cultural practices.

The need for local engagement and FPIC presents particular challenges for screening the social HCVs, because meaningful engagement with all communities across a large geographic area requires substantial time and resources and is therefore often impractical in a screening exercise at the landscape-level. Despite this it is essential that the social HCVs are fully incorporated into the screening process, although the approach to screening the social HCVs is necessarily different from that for the environmental HCVs e.g.: much of the social screening process is carried out not for individual values (since these cannot be identified remotely) but for social HCVs overall, as a single category.

SUB-STEP 3A: USE AVAILABLE INFORMATION TO IDENTIFY POTENTIAL SOCIAL HCVS IN THE LANDSCAPE

The principal focus is on collation and presentation of information on social and cultural characteristics of the landscape in a form that is most useful for the purposes of the screening (such as to inform land-use planning or to simplify subsequent local assessments). Sub-step 3A would allow the identification of potential social HCVs in the area, by building on the relevant information sources in Annex 1, and assembling more detailed information on social, economic, and cultural factors that are relevant for the conservation of social HCVs within the landscape **(See Table 9).** This will normally involve:

- Web searches, a review of publicly available information, and compilation of available resources and datasets.
- Consultation with relevant social experts and institutions holding specialist knowledge about the country or region.

The latter may include staff from relevant CBOs, NGOs, and government ministries; academics, independent researchers, and other experts; and members of representative community organisations where these exist at the landscape or jurisdictional level.

The most effective way to combine these two approaches is to move back and forth between them. For example, some initial web searches should be undertaken prior to consultation to gain an overview of the landscape. This information will be useful in planning the consultation process and will enable a much more in-depth discussion than would otherwise be the case. Consultation, in turn, will normally reveal additional information sources and datasets that can then be incorporated into the emerging summary. Some of these may be held locally and may not be publicly available.

The most appropriate level of consultation will vary with the aims and objectives of the screening exercise. The greater the level of consultation, the more robust and detailed the findings are likely to be. Consultation and engagement will also help to build support within the region (for example, for a land-use planning process). However, these advantages must be balanced against practical considerations, including the time and resources available.

As part of this sub-step an appendix should be set up where all resources used will be listed, with details of where they can be accessed. These should be added to throughout the social screening exercise. Permission should be sought from each participant to include their names and contact details in an appendix to the report.

The table below outlines the topics that need to be covered, with examples of the kinds of descriptive and spatial information that may be included. These include both contextual factors and factors that are linked to each class of social HCVs (local environmental services, livelihoods values and cultural values). The information can be presented in sections using the headings in the table, with each section including both the descriptive information and accompanying maps, or maps can be presented together in an appendix for ease of reference. Where no data are available, this should be flagged. Any potential conflicts with the environmental HCVs that are identified also should be flagged and measures to explore them further included in the report.

Table 9. Examples of useful information for identifying social HCVs in the landscape.

	Examples of descriptive (qualitative and quantitative) information, presented as text, tables, and figures	**Examples of spatial information, presented as maps**
Contextual factors		
State institutions	Relevant government institutions with different areas of responsibility and at different scales	Maps of jurisdictional units (e.g. states, provinces, districts etc.)
Human populations	Overall population size and density; breakdown by religious and ethnic groups; patterns of settlement	Maps of overall population distribution / densities Maps of human settlements. Where published maps may be inaccurate or out of date this should be indicated and where practicable they should be ground-truthed against satellite images
Socio-economy	Major economic activities; wealth, poverty, and equity (including in relation to education and literacy, access to healthcare, clean water, and sanitation)	Maps of the broad distribution of these factors (where available)
Physical infrastructure	The state of the physical infrastructure	Maps of transport infrastructure; electrification; communications infrastructure; also maps showing major infrastructural features such as hydroelectric dams
Land use	Current land use and outline of historical trends	Maps of current land use at the landscape / subunit levels Maps of areas under different designated land use categories
State governance	Accountability, transparency, corruption, and the rule of law; legal status of indigenous / traditional peoples; the state of civil society	
Customary governance and tenure	Customary systems of social organisation and representation and customary systems of land tenure and resource rights, including inheritance / transfer mechanisms (for each ethnic group present)	

	Examples of descriptive (qualitative and quantitative) information, presented as text, tables, and figures	Examples of spatial information, presented as maps
Relevant legal and policy mechanisms for recognition of indigenous / communal tenure and use	Indigenous / communal land tenure categories; other mechanisms for recognition of communal natural resource rights and management (e.g. community forests or waterways, community conservation areas, conservancies)	Maps of areas recognised or proposed under different mechanisms
Factors of relevance for HCV 5 (livelihoods values)		
Rural livelihoods	Brief description of livelihoods of different subgroups of the rural population	Maps of known areas used for livelihoods by different subgroups of the population
Key natural resources	Species, habitats, and land use types that are known to be key components of livelihoods and /or in short supply. These may include resources that are key in particular seasons or during extreme events	Maps of key habitats / land use types, where this is possible at the landscape / subunit scale Maps showing essential locations used during extreme events such as droughts, floods, fires, and earthquakes More detailed maps of HCV 5 in areas where participatory mapping data are available and FPIC is in place for their use
Factors of relevance for HCV 6 (cultural values)		
Cultures	Description of the different cultures present in the landscape, with a focus on belief systems, cultural values, and key aspects of cultural identity	Distribution maps of ethnic groups and / or faiths
Cultural sites of local significance	Description of features of cultural value for each ethnic or faith group present. E.g., burial sites, sacred sites, sites used in ritual, and species and landscape features of cultural value	• Maps showing locations of sacred or culturally significant sites and landscape features such as mountains, lakes, forests, rivers, and waterfalls • Maps of HCV 6 in areas where participatory mapping data are available and FPIC is in place for their use
Cultural sites of global or national significance	Summary of sites present of global or national cultural significance	Maps of sites recognised nationally or internationally, and of any additional sites identified in the literature or by social experts as of potential national / international significance

The detailed description of the social landscape should allow the screening team to indicate which HCVs are likely to be present in the landscape. Overall, social HCVs are likely to be present wherever there are local communities whose livelihoods are based wholly or substantially on the use of local natural resources. However the opposite cannot be assumed to be the case: the absence of communities cannot be interpreted to indicate the absence of social HCVs, because a community may rely on resources over an extensive area and some essential resources and cultural sites may be far from any settlements. Some examples include:

- Uninhabited high-altitude areas which are the only source of certain medicinal plant species
- Extensive hunting grounds for wide-ranging species such as peccaries, tapir, elk, and caribou
- Essential seasonal resource use areas accessed by mobile users
- Watering holes, or livestock grazing areas that are critical in times of extreme drought, but are otherwise unused
- High peaks or caves that are traditionally used for refuge during floods, earthquakes, or cyclones and / or are important sacred sites
- Breeding grounds of migratory fish species that are fundamental sources of protein
- River water on which communities rely for drinking, washing, fishing, etc. even in relatively developed areas

Sites that are of global or national cultural significance are likely to be well known and documented and are often already recognised and protected as part of global and national cultural heritage. As such, they are relatively straightforward to identify and map. Consult relevant data sources from Appendix 1 and review and expand to include details of all relevant national sources. For example, there may be relevant information in a National Cultural, Heritage or Ecotourism Strategy. Consultation is also important in identifying sites that are not yet formally recognised as of national/ global significance but may qualify.

SUB-STEP 3B: IDENTIFY INDICATORS FOR SOCIAL HCVS AND CUT-OFF POINTS FOR PROBABILITY CLASSES

For the potential social HCVs, the team will decide if it is possible to develop probability levels that differ within the study area. The table below gives examples of indicators for these categories. Where there are insufficient data to determine probabilities, this should be indicated as a data gap and follow-up steps should be recommended to fill the gap.

Table 10. Probability of presence for local social values (HCVs 5 and 6) can be presented as a table alone, or a table complemented by maps where appropriate. In both cases, it is useful to include an additional column of information on likely follow-up work that will be required after the screening exercise.

Probability category	Examples of indicators	Follow-up to the screening process that is likely to be required
Confirmed or High	• Presence of indigenous / traditional communities or communities with subsistence-based or mixed economies • Titled or customary indigenous and local community lands and resource use areas • Areas designated for communal / subsistence use (such as community or communal reserves, extractive reserves, community forests, community conservation areas etc) • Designated / customary sacred sites • Other areas where there is evidence for substantial use by indigenous / traditional communities or communities with subsistence-based or mixed economies • Datasets are already available from recent participatory mapping of local social values	• Engagement with all local communities and, subject to their FPIC, participatory mapping of social HCVs at the local level
Higher	• There is evidence of probable use of the area by indigenous / traditional communities or communities with subsistence-based or mixed economies.	• Initial consultation with local experts and social NGOs / CBOs to confirm which communities are involved. • Consultation with the communities concerned to ascertain the likely extent and nature of use. • If relevant (and subject to the communities' FPIC), participatory mapping of local social values.
Lower	• There are no indigenous / traditional or subsistence-based communities present, no indication of any use by such communities, and no indication of cultural or ecosystem services values.	• In some situations (especially in fully industrialised countries) allocation to this probability category will be straightforward and no further consultation or fieldwork will be necessary. • Where there is doubt, local experts and /or social NGOs and CBOs must be consulted, and the probability category revised as appropriate.
Unknown	• Data deficient / accuracy of data unknown or questionable	• Initial consultation with local experts and / or social NGOs and CBOs may be sufficient to revise the probability category. In some cases, it will also be necessary to consult nearby communities. • Once the probability category is revised, follow-up required as outlined in previous rows.

Table 11. Probability of presence for national or global HCV 6 can be presented as a table alone, or a table complemented by a map where appropriate. The broad indicators in this table should be reviewed and adjusted as necessary to reflect local conditions.

Low or lower probability of HCV 6	High or higher probability of HCV 6	Confirmed presence of HCV 6
• No information found on any sites of potential national or international significance	• Sites are under consideration for designation/ formal recognition as of global /national significance • Sites are identified in the literature as of national or sub-national significance although they have not been formally recognised	• UNESCO World Heritage Sites • Nationally designated sites • Sites are designated or formally recognised as of global/national significance

ASSESS WHETHER PROBABILITY MAPPING OF SOCIAL HCVS IS APPROPRIATE

In many cases probability mapping of the local social HCVs is not possible during screening, because of the need for local engagement and FPIC. The decision on whether to undertake probability mapping of local social HCVs should be based on whether there is sufficiently robust information and sufficient spatial variation in the landscape to justify this. If the landscape is socially uniform – for example if the whole landscape is inhabited by traditional communities living by subsistence – then it is unlikely that probability mapping will be feasible because little information on spatial distribution of the social HCVs is likely to be available (except in areas where data from prior participatory mapping are available). However, if the social landscape is more variable, then probability mapping of the social HCVs may be a useful way to integrate the different spatial datasets that are set out in the previous section. For example, areas of the landscape that are inhabited by remote indigenous peoples who live entirely from their local natural resource base have a high probability of containing social HCVs whereas if there are large areas that are uninhabited or home only to waged labourers, then they are less likely to do so.

Preliminary mapping of large-scale data could help determine where to conduct targeted community sampling (if this were to be included in the screening exercise).

Ideally, site-level sampling of a subset of representative communities could complement the desktop work to gain an understanding of typical land use patterns, livelihoods, areas of activity and culturally important features. This kind of community sampling could provide explicit assumptions to inform indicative mapping of potential HCV 5 and 6 (using e.g. key landscape features such as natural ecosystems used to provide goods and services).

SUB-STEP 3C: PRODUCE PROBABILITY MAPS FOR SOCIAL HCVS

Any social HCV maps that are produced should not be considered as final – but should be used as tools for communication (and possibly negotiation) between land managers and local stakeholders, for developing participatory management schemes, and for ongoing social engagement processes. Social maps should 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. Sites that are of global or national cultural significance (HCV 6) are likely to be well known and documented and are relatively straightforward to identify and map.

STEP 1

Define purpose and scope

State the purpose of the screening exercise and define the area to which the screening will be applied.

STEP 2

Gather information for analysis

Gather information including literature review, spatial data and stakeholder and expert consultation to provide the basis for estimating which HCVs and threats are likely to be present in the landscape.

STEP 3

Determine likelihood of HCV presence

After considering available data, prepare lists of potential HCVs, contextual and/or tabular descriptions of potential HCVs, lists of information sources and HCV probability maps (where relevant).

STEP 4

Determine likelihood of threats to HCVs

Prepare list of potential threats and consider their impacts on HCVs, then prepare contextual and/or tabular descriptions of threats, lists of information sources and threat maps (where relevant).

Sub-step 4A:

Use available information to identify threats to HCVs

Sub-step 4B

Identify indicators and cut-off points for threat levels

Sub-step 4C

Is mapping appropriate?

yes

Produce threats maps

and

no

Produce tables, texts, lists, etc. on threats to HCVs

STEP 5

Identify priorities in the landscape

Overlay (maps) or consider together (contextual information) probabilities and threats to determine where in the landscape to focus conservation and community engagement efforts. This step is essential for prioritising and planning interventions and next steps.

STEP 6

Present results

The screening process and results can be shared with stakeholders during the process to gather input. The results should be developed into a final report with accompanying data and references.

STEP 4: IDENTIFY THREATS TO HCVS

In addition to determining which HCVs are likely to occur in the landscape the team must identify potential threats to those HCVs. As long-term maintenance is the ultimate HCV management goal, analysing threats to values helps to direct attention to where and how threat mitigation can be carried out. The overall approach for threats is like Step 3 (estimating likelihood of HCV presence) and consists of the following sub-steps:

SUB-STEP 4A: USE AVAILABLE INFORMATION TO IDENTIFY THREATS TO POTENTIAL HCVS IN THE STUDY AREA

The threat analysis should look generally at the kinds of threats in the landscape and consider how they impact different HCVs (e.g. HCV 1 forest-dependent bird species, HCV 1 savannah-dependent plants, HCV 4 riparian areas, etc.) as each type of HCV might be impacted differently by a specific threat. Annex 1 provides a list of potential data sources to consider and adapt depending on the context.

Things to consider when deciding on how threats may affect environmental HCVs include:

- The availability and configuration of suitable habitat affects species populations and communities
- Vulnerability to habitat loss and degradation will depend on species' ecology and life-history characteristics
- Animals and plants are generally more sensitive and less resilient where they occur as small, isolated populations versus in areas where they are more widely distributed
- Landscape-level ecosystems (HCV 2) can generally tolerate some human activities, but their spatial configuration can be critical to their resilience. Changes to the 'core areas' of these ecosystems are more likely to result in degradation than impacts on edge areas which may already be affected to a certain extent.

- For naturally rare ecosystems (HCV 3), any loss or degradation can be drastic, leading to the loss of the ecosystem and its associated biodiversity

- Threats to HCVs can be assumed to be lower in protected areas, and higher in other land use zones where for example agriculture and other conversion activities may be permitted and where human population and road networks are denser

Things to consider when deciding on how threats may affect social HCVs include:

- Information on threats to social values may be shown in maps where threats apply to specific locations (such as proposed new roads or protected areas) or in text and tables where it applies to the whole landscape (such as inappropriate legal or fiscal measures on land tenure and use, or on safeguards for minority cultures).

- Threats that severely disrupt local ways of life are likely to affect multiple values related to livelihoods (HCV 5) and to culture (HCV 6), and therefore threats are assessed during HCV screening for all social HCVs together.

- The creation of new protected areas can pose a threat to the social HCVs and description of any cases of this kind should include an objective account of potential impacts and be flagged for more in-depth analysis after the screening.

- Changes in law and policy can pose major threats to the social HCVs, especially where they affect local people's security of tenure and access to land and resources. Many of these threats occur uniformly over entire jurisdictional units and therefore cannot be mapped.

Many threats to the social HCVs also threaten the environmental HCVs: examples include both natural disasters and human activities such as forest clearance for commodity expansion or road construction. Therefore, the threat assessment should include an analysis of available information on development plans affecting the landscape and collation of information on proposed developments, including of infrastructure development and commodity concessions.

SUB-STEP 4B: IDENTIFY INDICATORS FOR EACH THREAT AND DETERMINE CUT-OFF POINTS FOR THREAT CLASSES

The screening team identifies indicators for threats to HCVs, based on the available information. Threat levels can be specific to a potential HCV (e.g. an HCV 1 species), or a group of potential HCVs (e.g. all environmental HCVs or all social HCVs) and should be classified, e.g. as lower or higher, based on the likely impact of those threats. Results of the threats analysis could be presented in narrative text and with tables for the whole landscape or tables for different subunits of the landscape. Or, if spatial information is available, threat maps can be produced as explained in the next section.

Table 12. Examples of threats and how they may be classified into lower or higher threat levels.

	Lower threat level	Higher threat level
Hunting or collection of plants and animals	• Habitat generalists, with high population recovery rates. • Species with moderate to rapid population growth and recovery rates. • Species that tolerate some degree of habitat disturbance. • Hunting or collection rates do not cause population decline over the long-term.	• Species with very narrow range distributions and localised populations will be heavily impacted by habitat loss. • Species with slow reproductive and population recovery rates. • Species highly sensitive to changes in environmental conditions.
Intensive logging or clear-cutting that results in habitat conversion and ecosystem degradation and destruction	• Threat causes some level of disturbance to large ecosystem, but does not reduce its spatial extent, the mosaic of ecosystems, major large-scale processes, or threaten viable populations of keystone species. • Landscape ecosystems with a high proportion of PAs, and strong legal protection. Or areas in the landscape which are protected. • Ecosystem is resilient to impacts of the threat, quickly regenerating and returning to previous functioning.	• Ecosystem is highly sensitive to disturbance • Threat will result in the disappearance of distinguishing biotic and abiotic variables • Landscape ecosystems that have already been reduced or heavily disturbed, where further impacts may lead to the loss of viable populations of most species. • Fragmentation would lead to ecological isolation.

For quantitative indicators cut-off points can be established for threat classes, and in some cases multiple indicators need to be combined to establish threat levels relevant to specific HCVs. If information is available on the spatial differentiation of threats in the landscape, then mapping may be possible. However, if very limited information is available, or it proves to be impossible to develop meaningful indicators, the screening team might decide to consider the threat level to a specific HCV to be uniform across the study area, and if needed to apply the precautionary approach. Table 13 shows an example of how threat levels were classified in an HCV screening exercise in Cameroon.

Table 13. Example from Mbangassina (Cameroon) HCV Screening exercise. The column labelled "HCVs possibly impacted" could be differentiated into types of HCVs (e.g. HCV 1 forest-dependent bird species). Courtesy of Proforest.

IUCN THREAT CATEGORY	IUCN THREAT SUB-CATEGORY	THREAT TYPE	Direct threat (detailed explanation in context)	Underlying drivers	HCVs possibly impacted	Threat level
2 Agriculture & aquaculture	2.1 Annual & perennial non-timber crops: • 2.1.1 Shifting agriculture	Threat causes habitat loss through uncontrolled fire	Use of fire for land/ farm preparation	• Lack of alternatives / support for alternative shifting methods	HCV 1 HCV 3 HCV 4 HCV 5 HCV 6	**HIGH** • 2 km buffer around villages • 2km buffer around farmlands • 2km buffer on the savannah-forest transition zone **LOW** • All other areas
	2.1 Annual & perennial non-timber crops: 2.1.2a Small-holder farming	Threat causes habitat loss and ecosystem fragmentation.	Settlement expansion from immigrants coming for work on cocoa farms on the savannah forest border	• Migration for work • Increasing road network; • Lack of enforcement of environmental regulations	HCV 1 HCV 3 HCV 4 HCV 5	**HIGH** • 2 km from the forest savannah-transition zone **LOW** • All other area
	2.1.2b	Threat causes species decline	High forest encroachment (from cocoa farms) within the landscape have made some RTE species in decline or extinct from the region	• Migration for work • Increasing road network; • Lack of enforcement of environmental regulations	HCV 1 HCV 3 HCV 4 HCV 5	**HIGH** • 2 km from the forest savannah -transition zone **LOW** • All other area
	2.3 Livestock farming & ranching: • 2.3.2 Small-holder grazing, ranching or farming	Threat causes human-wildlife conflicts over water resources	Conflicts between livestock from farmers and wild animals over water resources	• Inadequate supervision of producers/ livestock owner • Rivers dry up due to climate change	HCV 1 HCV 5	**HIGH** • 2 km from the forest savannah transition zone And • 1km around water sources **LOW** • All other area

5 Biological resource use	5.1a Hunting & collecting terrestrial animals • 5.1.1 Intentional use (species being assessed is the target) • 5.1.2 Unintentional effects (species being assessed is not the target)	Threat causes species decline	Hunting is continuing and non-selective, wastage is often recorded through forgotten traps in the forest	• No available, affordable, or palatable alternative protein sources • Ineffective enforcement of environmental regulations *("[...] remains prevalent despite the constant control of minfof forest guides") • Presence of market for bushmeat	HCV 1 HCV 5	**HIGH** • forests within 5 km of villages **LOW** • Everywhere else
	5.1b	Threat causes habitat loss (uncontrolled fire)	Use of fire for hunting	• no available, affordable, or palatable alternative protein sources • ineffective enforcement of environmental regulations *("[...] remains prevalent despite the constant control of MINFOF forest guides") • Presence of market for bushmeat	HCV 1 HCV 3 HCV 4 HCV 5	**HIGH** • 2 km buffer around villages • 2km buffer around farmlands • 2km buffer on the savannah-forest transition zone **LOW** • Everywhere else
8 Invasive & other problematic species, genes & diseases	8.4a Problematic species/diseases of unknown origin • 8.4.2 Named species	Threat affecting livelihoods (food and income production)	Diseases such as Cocoa vascular streak dieback "dieback" is very common and affects cocoa producers	• Poor knowledge on diseases and pest management	HCV 4 HCV 5	**HIGH** • 1 km buffer around cocoa fields/areas **LOW** • Everywhere else
	8.4b	Threat affecting population health	Presence of black flies in Sanaga, Mbam and Djim rivers transmitting onchocerciasis (river blindness+ epilepsy)	• Poor knowledge on diseases and pest management	HCV 5 HCV 6	**HIGH** • 5km buffer around Sanaga / Mbam/Djim rivers • 500m buffer around all other rivers **LOW** • Everywhere else

9 Pollution	9.3 Agricultural & forestry effluents • 9.3.1 Nutrient loads • 9.3.2 Soil erosion, sedimentation • 9.3.3 Herbicides & pesticides	Threat causes pesticide runoff and risk of pollution in soil, water	Cacao farming is a risk for pollution of soil and water due to use of pesticides against various pests/disease affecting the cultures + leaving pesticides wrapping in fields after use (non-biodegradable)* or burnt health threat	• Lack of knowledge on proper management of pesticides/ herbicides uses • Lack of knowledge on PPE	HCV 1 HCV 3 HCV 4 HCV 5 HCV 6	**HIGH** • 2 km buffer around villages • 2km buffer around farmlands • 500 m buffer around rivers/water sources **LOW** • Everywhere else
11 Climate change & severe weather	• 11.2 Droughts	Threat that causes water stress	Climate change lead to variability in water table and threat to sources of drinking water	• Climate change • Lack of stable/ constant annual water sources for municipalities	HCV 1 HCV 3 HCV 4 HCV 5 HCV 6	**HIGH** • Water sources and buffer 2km near 8 Villages mentioning difficulties for water access • All other water sources buffer 500m **LOW** • Everywhere else

In the case of screening in Kapuas Hulu, West Kalimantan, the team chose seven threats which potentially impact the environmental HCVs. Table 14 lists the threats with a brief explanation, a reference for the data used and how threat classes were defined as either higher or lower. This tabular information is then used as the basis for threat mapping (see **Figure 13**).

Table 14. Example of seven threats in Kapuas Hulu screening exercise with a brief explanation, a reference for the data used and how threat classes were defined as either higher or lower. This tabular information is used as the basis for threat mapping in Figure 13 .

Threat type	Explanation or Assumption	Data used	Definition of threat classes	
			Criteria Values	Level
1 Spatial planning / Land status	• Spatial planning and/ or land status under state forest function. • The more protected by the government the lower the threat.	SK 733, MoEF 2014	• Production/Cultivation Areas (HPT, HP, HK, APL) • Conservation and Protection Areas (National Park), Protection Forest)	HIGH LOW
2 Land-Forest Fire	• Hotspot density (10 years) by Kernel Density Estimation • The areas within high and very high hotspot density are higher threat	Fire hotspot (https://firms.modaps.eosdis.nasa.go v/)	• High – very high density • Very low – Moderate density	HIGH LOW
3 Crop Suitability	• Suitability of lands for various agricultural crops • The more suitable the land for commodities the higher the threat	Peta Kesesuaian lahan untuk 6 komoditas utama (Badan Litbang Pertanian)	• Land suitable for commodities (crop, etc. • Land not suitable for commodities (crop, etc.)	HIGH LOW
4 Private Concessions: oil palm and industrial plantations	• Impact of forest clearing activities and infrastructure development • Distance to boundaries of concession areas (mining, logging, oil palm and HTI)	Pemanfaatan kawasan hutan (MoEF, 2017)	• Distance from concession boundary <1000m • Distance from concession boundary >1000m	HIGH LOW
5 Road access	• Distance to road • The farther away from the road the lower the threat	Topographic Map (BIG, 2016)	• Distance from road < 1000 m • Distance from road > 1000 m	HIGH LOW
6 Location of settlements	• Distance to nearby settlement • The farther away from the settlement the lower the threat	Topographic Map (BIG, 2016)	• Distance from settlement < 2 Km • Distance from settlement > 2 Km	HIGH LOW
7 Potential loss of forest	• Forest loss area projection due to various activity by forest loss alert. • Forest areas existing within forest loss alert are higher threat.	Forest Loss Alert, Global Land Analysis and Discovery, University of Maryland	• Forest area existing within forest loss alert • Forest area existing outside forest loss alert	HIGH LOW

INFORMATION ON THREATS TO SOCIAL HCVS

Depending on the context, it is possible to classify threat levels to social HCVs as lower or higher (see Table 15). To determine threat levels, it is useful to consider:
Immediacy of the threat and the likely severity of impacts, the most severe of which may be permanent dispossession and displacement.

VULNERABILITY AND RESILIENCE

Vulnerability is especially high for isolated communities with little contact with external society, and for communities that remain largely outside the market economy. For other indigenous, traditional and subsistence communities the most important determinant of social vulnerability (and therefore of threats to livelihoods and cultural values) is security of land and resource rights. Even where national constitutions and laws recognise customary and/or traditional rights, lack of implementation of land titling and lack of support on the ground may leave communities, and the corresponding social HCVs, exposed to the threat of invasion and displacement.

Factors related to resilience include the diversity and substitutability of livelihoods; community assets and capabilities, and social, economic, and cultural adaptability to change. Food and water security are two aspects of resilience that are pertinent for subsistence-based communities in landscapes that are undergoing a rapid pace of change. Local community livelihoods are more vulnerable to factors such as impacts of droughts or floods where subsistence farming plays a major role in food production, where economic margins are small and where poor infrastructure makes it more difficult to provide support from other areas in times of shortages. At the landscape scale, it is unlikely that these factors can be quantified or assessed in detail. However, a qualitative description of the vulnerability of local communities in different parts of the landscape can be constructed from the information gathered in Step 2, together with information provided through consultation with social experts.

Table 15. Potential threats to social HCVs and how to present the information qualitatively and spatially.

Potential threats to social HCVs	Examples of descriptive (qualitative and quantitative) information, presented as text, tables, and figures	Examples of spatial information, presented as maps. Note: It may not be useful to map these in relation to HCVs unless it was appropriate to map the social HCVs.
Proposed major development projects	Analysis of relevant national / regional development plans; description of planned or proposed development (e.g. infrastructural, natural resource extraction, commodity development)	• Maps of proposed roads and other infrastructure projects • Maps of mines, hydroelectric dams, and other major current and proposed development projects • Maps of proposed commodity concessions (hydrocarbons, agro-commodities)
Proposed new protected areas	Description and explanation of potential effects on social HCVs	Maps of proposed new protected areas
Areas of population expansion / settlement	Description of trends and trajectories in population distribution, mobility, and migration	Maps indicating major areas of population movement / expansion / settlement
Areas of social unrest / conflict	Major sources of conflict or civil unrest	Maps of conflict zones
Areas vulnerable to natural disasters	Description of types of areas	Maps of vulnerable areas
Proposed relevant changes in law and policy	Relevant proposed changes in law, including in relation to land tenure; to community natural resource management; to indigenous, community and cultural rights, and to development, among others	Not usually spatially determined

SUB-STEP 4C: IF MAPPING IS APPROPRIATE, PRODUCE THREAT MAPS

Does the available information allow for spatial differentiation of threats in the study area? If so, then threat maps can be developed based on the available spatial information and the identified indicators and cut-off points. Many practitioners find it useful to produce separate maps for each type of threat – showing which HCVs are affected by that threat.

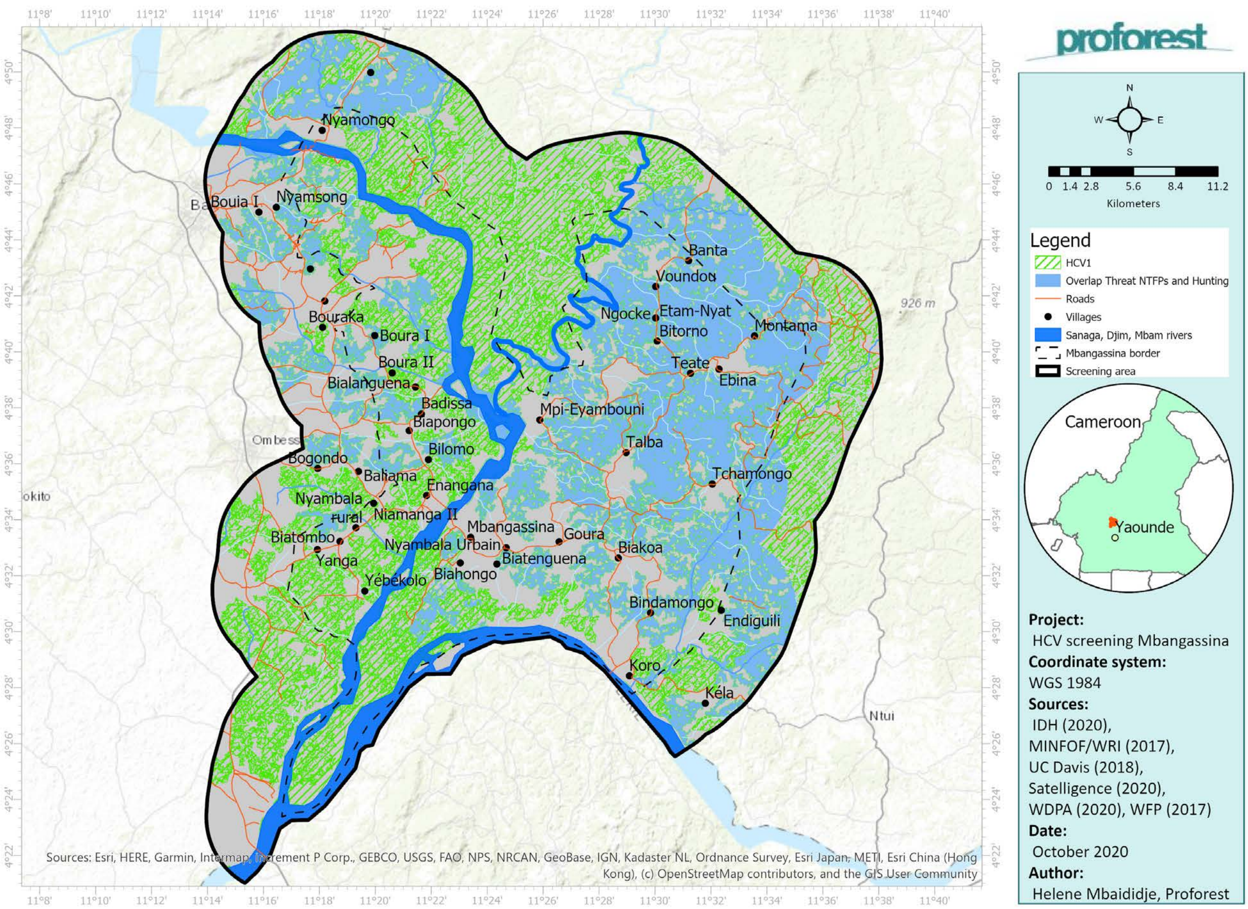


Figure 12. Potential HCV 1 areas overlaid with threats (collection of NTFPs and hunting) from an example in Cameroon, courtesy of Proforest.

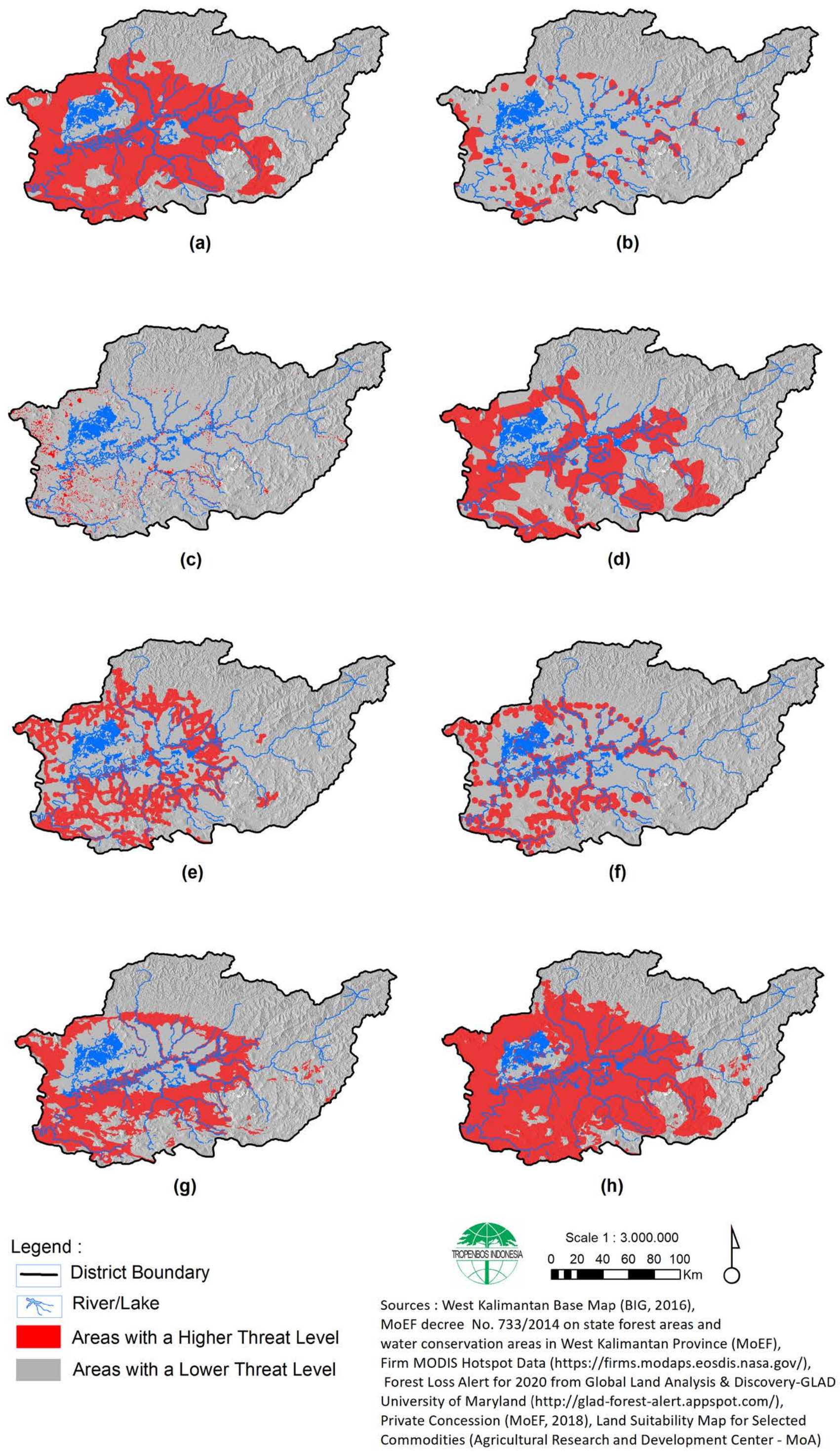


Figure 13. Seven types of threats identified in Kapuas Hulu District based on: Land status (a), Forest and land fire (b), Potential forest loss (c), Private concession area (d), Proximity to roads (e), Proximity to settlements (f), Crop suitability (g), and all threats (h).

STEP 1

Define purpose and scope

State the purpose of the screening exercise and define the area to which the screening will be applied.

STEP 2

Gather information for analysis

Gather information including literature review, spatial data and stakeholder and expert consultation to provide the basis for estimating which HCVs and threats are likely to be present in the landscape.

STEP 3

Determine likelihood of HCV presence

After considering available data, prepare lists of potential HCVs, contextual and/or tabular descriptions of potential HCVs, lists of information sources and HCV probability maps (where relevant).

STEP 4

Determine likelihood of threats to HCVs

Prepare list of potential threats and consider their impacts on HCVs, then prepare contextual and/or tabular descriptions of threats, lists of information sources and threat maps (where relevant).

STEP 5

Identify priorities in the landscape

Overlay (maps) or consider together (contextual information) probabilities and threats to determine where in the landscape to focus conservation and community engagement efforts. This step is essential for prioritising and planning interventions and next steps.

STEP 6

Present results

The screening process and results can be shared with stakeholders during the process to gather input. The results should be developed into a final report with accompanying data and references.

STEP 5: IDENTIFY HCV PRIORITIES IN THE LANDSCAPE

Step 5 produces the 'results' of the screening exercise – e.g. showing which HCVs in the landscape are likely to be most important (i.e. often those that are most threatened or most at risk) and which therefore need targeted follow up work in terms of discussion, fieldwork and community engagement and mapping efforts.
Table 16 shows how the priority levels (from a positive perspective) or risk levels (from a negative perspective) for different HCVs are a function of the probability of presence and the threat level.

Table 16. Step 5 combines probability of presence with threat level to arrive at priority levels. Note that more categories of priority are possible depending on the number of probability and/or threat classes.

		Probability of HCV Presence	
		Lower Probability	**Higher Probability**
Threat level to HCV	**Higher Threat**	**Priority: Medium** (High Probability & Low Threat)	**Priority: High** (High Probability & High Threat)
	Lower Threat	**Priority: Low** (Low Probability & Low Threat)	**Priority: Medium** (Low Probability & High Threat)

The screening results should be interpreted and presented in relation to the purpose and objectives of the screening exercise with a focus on which values are most urgent to attend to with follow-up activities. Results may be presented for the landscape as a whole, or for relevant subunits based on management responsibility and / or intervention strategies for example by administrative units (especially if a jurisdictional project), geographical zones, land use types or commodity production areas. Regardless of how the team chooses to organise the results – ideally the preliminary results should be shared with stakeholders in the landscape to help with interpretation and to provide valuable feedback and recommendations for practical uses of the screening results. Examples of different ways to present results are provided below.

Table 17. Illustration of how priority levels can be presented per HCV/HCV group and per geographical area (subunit), so that one can see where different HCVs are most at risk. The threat(s) is not specified in this table, but it could be linked to a threats table.

HCV	Description	Subunit A	Subunit B	Subunit C	Subunit D
HCV 1	White-backed vulture	**Low:** Low Probability & Low Threat	**Medium:** Low Probability & High Threat	**High:** High Probability & High Threat	**Medium:** Low Probability & High Threat
HCV 2	iSimangaliso Wetland Park (332,000 ha, including the largest estuarine wetland in Africa, grasslands, bush and marine reserves - World Heritage site and Ramsar area with more than 500 bird species)	**Medium:** Low Probability & High Threat	**Medium:** High Probability & Low Threat	Not applicable	Not applicable
HCV 5	Natural forest ecosystems in Kwazulu- Natal (and Eastern Cape) important for livelihoods and well-being of rural communities as sources of building material, fuel wood, food and medicine.	Not applicable	**Medium:** High Probability & Low Threat	**High:** High Probability & High Threat	**Medium:** High Probability & Low Threat

Table 18. Illustration of how priority levels can be presented per HCV/HCV group and per threat type, so that one can see which threats are likely to impact different HCVs to different degrees (high, medium, lower). This can further be presented for different areas (subunits) of the landscape.

HCV or HCV group	**Threat type**			
	High Priority	**Medium Priority**		**Low Priority**
	High Probability & High Threat	High Probability & Low Threat	Low Probability & High Threat	Low Probability & Low Threat
HCV 1 (e.g. forest-dependent mammals)	Threat 1 (e.g. overhunting) and Threat 5	Threat 3	Threat 4	Threat 2
HCV 2				
HCV 3				
HCV 4				

Table 19. Illustration of how risk levels (instead of priority levels) can be presented per HCV/HCV group, along with area so that one can see which HCVs cover the most area in the landscape and how much of that extent is threatened or at risk and to what degree (high, medium or low). The threat(s) is not specified in this table, but it could be linked to a threats table.

HCV or HCV group	Area (ha)	Risk Level			
		High Risk	Medium Risk		Low Risk
		High Probability & High Threat	High Probability & Low Threat	Low Probability & High Threat	Low Probability & Low Threat
HCV 1 (e.g. forest-dependent mammals)	2,835,325	1,095,704 (39%)	1,430,436 (50%)	296,480 (10%)	12,705 (0.4%)
HCV 2	1,844,150	483,012 (26%)	1,245,396 (68%)	102,710 (6%)	13,032 (1%)
HCV 3	2,084,548	763,531 (37%)	1,265,109 (61%)	51,991 (2%)	3,916 (0.2%)
HCV 4	1,868,714	478,488 (26%)	964,379 (52%	208,616 (11%)	217,230 (12%)
Total HCV 1-4	2,887,985	1,109,924 (38%)	1,436,543 (50%)	328,507 (11%)	13,011 (0.5%)

The information in Table 19 can be developed into risk maps as shown in Figure 14 below.

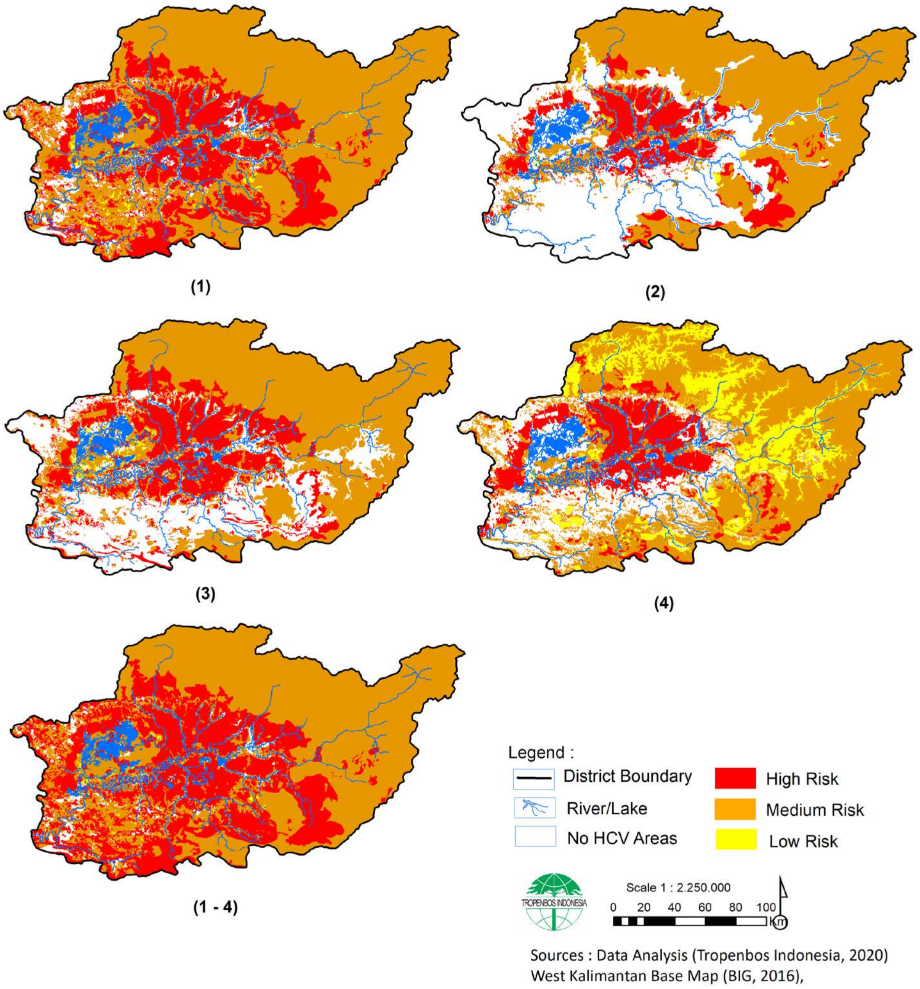


Figure 14. Illustration to show potential risks to environmental HCVs in Kapuas Hulu: (1) HCV 1; (2) HCV 2; (3) HCV 3; (4) HCV 4 and (1-4) Total HCV (High probability of presence; High threat level)

Table 20. Illustration of how to show the distribution of high-risk areas in different land classes in the landscape (>30% is highlighted in yellow for emphasis).

HCV and HCV Features	Area covered by high probability of presence	High Risk (High Probability & High Threat) per land class							
		National Parks		Protection Forest		Production Forest		Other Land use	
		ha	%	ha	%	ha	%	ha	%
HCV 1 Biodiversity centre	1,680,611	43,490	2.6%	195,880	11.7%	0		0	
HCV 1 Orangutan habitat	737,593	10,769	1.5%	84,980	11.5%	116,709	15.8%	40,608	5.5%
HCV 1 RTE concentration	2,465,446	23,161	0.9%	195,918	7.9%	511,321	20.7%	344,025	14.0%
HCV 1 Corridor	771,117	67	0.0%	31	0.0%	498,677	**64.7%**	269,055	**34.9%**
HCV 1 Riparian	146,907	11,795	8.0%	14,782	10.1%	25,257	17.2%	66,957	**45.6%**
Total HCV 1	**2,526,140**	**43,490**	**1.7%**	**195,918**	**7.8%**	**511,321**	**20.2%**	**344,025**	**13.6%**
HCV 2 Intact forest	1,366,368	1,758	0.1%	49,830	3.6%	96,122	7.0%	394	0.0%
HCV 2 Wetlands	362,040	4,991	1.4%	28,168	7.8%	123,026	34.0%	178,339	49.3%
Total HCV 2	**1,728,408**	**6,749**	**0.4%**	**77,998**	**4.5%**	**219,148**	**12.7%**	**178,733**	**10.3%**
HCV 4 Water source	1,128,357	6,965	0.6%	61,400	5.4%	150,246	13.3%	179,533	15.9%
HCV 4 Erosion control	641,905	2,721	0.4%	28,005	4.4%	43,735	6.8%	6,110	1.0%
HCV 4 Fire prevention	36,146	6,012	16.6%	1,615	4.5%	68	0.2%	3,671	10.2%
Total HCV 4	**1,442,867**	**14,682**	**1.0%**	**82,064**	**5.7%**	**186,340**	**12.9%**	**188,145**	**13.0%**
Total HCV	**2,546,467**	**46,290**	**1.8%**	**197,323**	**7.7%**	**511,433**	**20.1%**	**347,062**	**13.6%**

Examples of the kinds of results, questions and recommendations that can emerge during this step are:

- Overview of which HCVs are likely to occur in the landscape, and which are most threatened (by which threat types).
- What are the urgent actions needed? Which actions apply to the whole landscape and which apply specifically in one or more subunits? This will help guide discussion and actions for authorities and other stakeholders at the different levels. Depending on the context, it may also be useful for the screening team to "zoom in" on certain areas of the landscape for more detailed analysis according to the priorities of different stakeholders (e.g. government, communities, sustainable agriculture initiatives).
- If there are proposed substantial infrastructural developments such as roads, dams, construction projects or large mining and commodity concessions, then the areas affected may be a priority for more detailed planning and engagement and for site-level HCV or HCV-HCSA assessments – especially if local or indigenous communities are present and / or there is a high level of forest cover.
- If there are proposals for new protected areas then the areas affected may be a priority for site-level consultation and engagement.
- If there is an area with evidence of rapid settlement and agricultural expansion, there may be a need to develop measures to control immigration or alternatively for a smallholder engagement and extension programme.

- If there is a critical corridor (e.g. for landscape connectivity and maintenance of wide-roaming faunal species) under threat from conversion, stakeholders may decide to explore options for protecting it via a protected area or other conservation measures.

- If there is a particular ethnic group whose culture is highly threatened, there may be an urgent need for legal titling and safeguarding of their lands.

The results of the screening exercise can be shared through workshops and valuable feedback and interpretations can be gained through discussions and interviews. Maps should be understood to be tools for communication, negotiation, and planning, rather than an end goal. It is important to convey this in discussions with stakeholders and in the final report, to ensure that maps of potential HCVs are clearly identified as such and are not misused or taken out of context. Important topics, audience questions and comments and the team's responses should be noted.

Engaging with a range of stakeholders and seeking their input is valuable for creating an overall picture of the different relevant initiatives and the links between them - serving to encourage greater coordination going forward.

Different stakeholder groups or experts can also contribute valuable insights to how the screening results can be used. For example:

- District sustainability commitments could mean that a district must create an investment portfolio to showcase their commitment to meet sustainability goals. This can show where and how sustainable commodity production (which does not damage HCVs) happens/can happen within area zoned for agriculture. This information is important because the investment portfolios will be presented for prospective investors/buyers/partners.
- To provide recommendations to long-term regional development plans.
- Priority areas for FPIC processes and participatory mapping should be in areas where there is overlap between community areas and agricultural concessions.
- Smaller administrative units (e.g. sub-districts) play an important role in the effectiveness of linking village-level up planning with district planning.
- How can development planning and activities be guided to ensure that they also maintain HCVs?
- How to connect different levels of planning and management e.g.
  - District level: Coarse level social risk mapping can help prioritise where to focus engagement activities by identifying: the gaps in existing initiatives in or near areas that have been allocated for palm oil development. Priority areas for FPIC processes should be in areas where there is overlap with agricultural concessions.
  - Sub-district level: Sub-district level government processes can play an important role in linking village-level planning with district-level planning. Village-level management plans are aggregated at the sub-district level, and then fed into district-level planning processes. Results on environmental HCVs (e.g. forest-dependent faunal species) can be introduced into sub-district level processes to facilitate discussion on forest resource use and protection.
  - Village level: Meaningful FPIC processes must take place at the community level and participatory mapping of customary areas is essential. With the support of CSOs, communities who have been involved in FPIC processes within a sub-district can share their learning and experience with other communities, and support establishing the 'rules' for customary leaders to represent the community at higher (sub-district) level processes.

The analysis of results in Step 5 and any discussions and consultation can then be used to produce the screening report in Step 6.

STEP 1

Define purpose and scope

State the purpose of the screening exercise and define the area to which the screening will be applied.

STEP 2

Gather information for analysis

Gather information including literature review, spatial data and stakeholder and expert consultation to provide the basis for estimating which HCVs and threats are likely to be present in the landscape.

STEP 3

Determine likelihood of HCV presence

After considering available data, prepare lists of potential HCVs, contextual and/or tabular descriptions of potential HCVs, lists of information sources and HCV probability maps (where relevant).

STEP 4

Determine likelihood of threats to HCVs

Prepare list of potential threats and consider their impacts on HCVs, then prepare contextual and/or tabular descriptions of threats, lists of information sources and threat maps (where relevant).

STEP 5

Identify priorities in the landscape

Overlay (maps) or consider together (contextual information) probabilities and threats to determine where in the landscape to focus conservation and community engagement efforts. This step is essential for prioritising and planning interventions and next steps.

STEP 6

Present results

The screening process and results can be shared with stakeholders during the process to gather input. The results should be developed into a final report with accompanying data and references.

STEP 6: PRESENT RESULTS

Pulling together the results of the screening exercise and sharing and communicating those results (and accompanying data) is the final step. How the results are presented is flexible, but this section provides a report template that can be used or adapted by the screening team.

INTRODUCTION

SCOPE AND OBJECTIVES OF HCV SCREENING

- Explanation of who commissioned the screening exercise and for what objectives
- Description of boundaries and map of screening area
- Explain if the scope includes other initiatives/methods, for example HCS forest mapping (see Annex 3)

METHODS

It is important to document the methods and assumptions in the screening report, so that results can serve as a basis for site-level follow up activities. Describe methods used for e.g.:

- Information gathering,
- Stakeholder engagement,
- Choice of HCV indicators and decisions about mapping
- Explanation of how probability classes were defined using HCV indicators
- Explanation of any decision rules the team used
- Definition of threat classes
- Classification and use of subunits (if relevant)
- How the screening exercise was combined with field work, scoping and/or local consultation (if relevant)
- Land cover classification, including:
    - Source of image
    - Classification system
    - Map and table of land cover classification

It is a matter of preference if the methods are summarised in the main report and then detailed in annexes.

OVERVIEW OF SCREENING LANDSCAPE

An overall summary of the landscape including land cover and land use, and general social and environmental characteristics. E.g. can include:

PHYSICAL AND ENVIRONMENTAL CHARACTERISTICS:

- Landcover and land use
- Topography
- Geology and soil
- Hydrology (watersheds, catchments, reservoirs, rivers, etc.)
- Climate (temperature, amounts and annual patterns of precipitation and rainfall, etc.)

BIOLOGICAL AND ECOLOGICAL CHARACTERISTICS:

- Bioregion/biogeographic zones
- Ecosystem types
- Presence and condition of protected areas, forest reserves, important biodiversity areas
- Occurrence of known population of species of global, national, or regional concern
- Migration corridors
- Wetlands
- Peatlands
- Intact Forest Landscapes

SOCIAL, CULTURAL, AND ECONOMIC CHARACTERISTICS, INCLUDING:

- List of names and location of communities in the landscape/jurisdiction
- Demography
- Rural community livelihoods and natural resource use
- Ethnicity, major cultural values, and religious/traditional belief systems
- Customary systems of resource and land rights/land tenure
- Systems of social organisation and representation
- History of settlement and past and current land use
- Legal tools for recognition / designation of community areas
- Socio-economic activities
- Infrastructure and distribution of public facilities (health, education, market, etc.)
- Maps of settlements and other social and cultural features of the landscape.

LAND USE AND DEVELOPMENT TRENDS, INCLUDING:

- History of land use
- Development trends and future plans
- Brief history of forest disturbance and drivers of deforestation

SCREENING RESULTS

For each HCV or class of HCVs, present the following:

- Information sources (with detailed information in an annex, including how the information can be accessed for future work in the landscape).
- What HCVs are likely to be present in the landscape
- Probability of HCV presence, description of all possible HCVs and evidence/information to support conclusions.
- Maps of probability of HCV presence in the landscape as a whole and separate maps of distribution for each category of HCV where this is appropriate and where sufficiently robust data are available. Maps are an important output of the screening exercise; however which maps are produced and the level of detail in those maps will vary depending on the context where screening was used. All maps must be clearly explained and interpreted. One of the values of the maps is to show which areas are already well-documented (for some HCVs) and where data is lacking (i.e. which areas likely need what type of follow up work).
- Overlaps where conflicting land or resource uses and proposed uses may occur.
- Which parts of the landscape have higher concentrations of different HCVs.
- Justification for any HCVs classified as absent.
- Threats to each HCV or class of HCVs and threat level to the HCV in different parts of the landscape with maps.
- Results of risk assessment / priority setting for each HCV or HCV category across the landscape and in subunits (if relevant) indicating the areas that are in most need of urgent action.
- As far as the data allow and where appropriate, overlay different layers (environmental and social values, different HCV maps, planned development) to identify overlapping and potentially conflicting land uses. Flag these in the discussion and recommendations.
- Explanation of data gaps – this can promote collaboration to fill in needed data.
- The report should also include discussion of the limitations of the screening exercise including in terms of the level of detail, the robustness of the data, especially in relation to the social HCVs.

RECOMMENDATIONS

Discussion of recommended next steps will be dependent upon objectives of the screening exercise, context, etc.

- Recommendations for further detailed data collection, field validation and participation after screening should be focussed according both to the screening objectives and to where risks to HCVs have been identified as higher. For example, this would be the case:
  - Where conversion of natural vegetation is proposed
  - Where population displacement is proposed or could occur

    - Where land use changes are planned that have potential impacts on the rights and livelihoods of local communities
    - Where there are overlaps or conflicts between conservation, development projects, local people's rights and lands or areas of customary use
    - Where land use change is planned within a certain distance of a protected area

- Depending on the level of detail of the results, the team can propose recommendations for follow up actions to be discussed with stakeholders in the landscape. For example, although some recommendations can be made, detailed management and monitoring strategies must be determined with site-level stakeholder engagement, based on site-level conditions, capacity (skill and budget) and data availability.

ANNEXES

SCREENING TEAM

Explanation of who conducted the screening exercise as part of the core team and which partners, collaborators and stakeholders were actively engaged in the process. Qualifications and contact information for screening team. Screening should be coordinated by a team leader with relevant HCV expertise and experience, working with a team of social and environmental experts, and with partners in the wider landscape. It is preferable that the consultants are local to the country. Necessary skills and experience in the team include:

- In-country expertise and ideally, knowledge of, and familiarity with, the area concerned
- Good working knowledge of the HCV approach
- Ability to communicate in the national language and local languages
- GIS expertise
- Geographically relevant ecological experience, good understanding of threats and management practices, and good knowledge of principles of landscape ecology and conservation land-use planning
- Qualitative social science expertise (for example from the disciplines of anthropology or development studies), familiarity with local cultures including customary land tenure and use systems and local livelihoods, and skills and experience related to community engagement, and the concept of FPIC

TIMELINE OF SCREENING ACTIVITIES

RESOURCES

- Contact information for stakeholders and experts (where relevant)
- List of data/information sources including documents, maps, databases, etc. presented per HCV category, per subject area, etc.
- Documentation (notes, recordings, etc.) of interview, consultations, etc.

ADDITIONAL MAPS AND LISTS – IF NOT INCLUDED IN MAIN REPORT

- Lists of potential HCVs (especially important if they were not presented in mapping analysis)
- Maps of:
    - Location of environmental features (protected areas, large ecosystem blocks, IFLs)
    - Location of social features (human settlement, roads, infrastructure)
    - Land cover and land use (agricultural concessions, forestry, mining, etc.)

ANNEXES

ANNEX 1: INFORMATION AND DATA SOURCES RELEVANT FOR SCREENING

Information source or topic to investigate (e.g. through literature review, lists, consultation)	Useful for understanding which HCV(s)
HCV National Interpretations **https://hcvnetwork.org/libraries/**	All
Other national HCV frameworks (e.g. FSC)	All
Past HCV assessments and HCV-HCSA assessments	All
IUCN Red List Threat Classification Scheme **www.iucnredlist.org/resources/threat-classification-scheme**	For threats to HCVs
Consultancy / NGO reports, including recent EIAs, Strategic EIAs and SIAs	
Crop suitability maps (Alternatively one could do a compilation of altitude, slopes, soil types and other factors based on available data)	For threats to HCVs
Spatial plans / land use plans. Official land use designation/planning at the regional/provincial/national level published by government.	For threats to HCVs
Human footprint maps: **http://wcshumanfootprint.org/**	For threats to HCVs
National, subnational, and local Biodiversity Strategy and Action Plans **https://www.cbd.int/nbsap/**	1, 2, 3, 4
Location of: concessions (forestry, mining, agriculture), major infrastructure projects (e.g. dam and road networks)	For threats to HCVs
Relevant government policies e.g. provincial support for HCV approach, green growth initiatives, etc.	
National land cover classification	
Satellite Imagery: **https://earthexplorer.usgs.gov/**	1, 2, 3, 4
Consultation with experts	All HCVs
Research publications	All HCVs
IUCN species lists	1
IUCN species range maps	1
National protected species lists and endemic species lists	1
CITES Appendix I and II Listed species	1

Information source or topic to investigate (e.g. through literature review, lists, consultation)	Useful for understanding which HCV(s)
Data on habitat preference: identify areas of habitat (often overlapping with HCV 3) which could potentially support individuals or populations of HCV 1 species, or which are potentially required for a part of wide-ranging species' lifecycle	1 and 3
UNEP WCMC Critical Habitat screening map for marine and terrestrial environments **https://www.unep-wcmc.org/news/screening-for-critical-habitat**	1 and 3
Key Biodiversity Areas (e.g. Important Bird Areas,	1
Important Plant Areas, Alliance for Zero Extinction sites)	1
Threatened ecosystems, global ecosystem data sets e.g. **Mangroves:** Giri C, Ochieng E, Tieszen LL, Zhu Z, Singh A, Loveland T, et al. Status and distribution of mangrove forests of the world using earth observation satellite data (version 1.3, updated by UNEP-WCMC). Glob Ecol Biogeogr. 20:154–9. **Tropical dry forests:** Miles L, Newton AC, DeFries RS. A global overview of the conservation status of tropical dry forests. Journal of Biogeography. 2006; Available from: **http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2699.2005.01424.x/full** **Wetlands and peat: www.cifor.org/global-wetlands/ Rivers: https://zenodo.org/record/1297434#.XDYz_Fz7SUm** **Forest cover data** Hansen, M. C., P. V. Potapov, R. Moore, M. Hancher, S. A. Turubanova, A. Tyukavina, D. Thau, S. V. Stehman, S. J. Goetz, T. R. Loveland, A. Kommareddy, A. Egorov, L. Chini, C. O. Justice, and J. R. G. Townshend. 2013. "High-Resolution Global Maps of 21st-Century Forest Cover Change." Science 342 (15 November): 850–53. Data available from: **www.earthenginepartners.appspot.com/science-2013-global-forest** **Dryland ecosystems** **https://www.unep-wcmc.org/resources-and-data/world-dryland-areas-according-to-unccd-and-cbd-definitions**	3

Information source or topic to investigate (e.g. through literature review, lists, consultation)	Useful for understanding which HCV(s)
Intact Forest Landscapes	2
Maps of potential forest corridors	2
Endemic hotspots	1 and 3
Nationally or regionally recognised large ecosystems of conservation importance	2
Protected Areas	1,2, 3, 4
Integrated Biodiversity Assessment Tool – up-to-date maps of PAs, KBAs, IUCN Red-Listed species range maps **https://conservation.ibat-alliance.org/**	1, 2, 3
Ramsar sites (internationally important wetlands)	2
Digital Elevation Models **www.asf.alaska.edu/**	
Soil maps	4
Peat maps	3 and 4
Hydrology maps (e.g. catchments, rivers, flood zones)	4
Fire hotspots (e.g. NASA). Historic hot spot maps and mapping land covers that are susceptible to fire can indicate areas with higher threat levels.	For threats to HCVs
Water risk maps: http://waterriskfilter.panda.org/en/Explore/Map **https://www.wri.org/resources/maps/aqueduct-water-risk-atlas** **http://water.globalforestwatch.org/**	For threats to HCVs
Global Forest Watch Hansen tree cover loss	For threats to HCVs
Literature including reports and studies from protected areas, conservation areas, protection forest, etc.	1, 2, 3, 4 - possibly 5 and 6
Government sources: • statistics websites / databases (including national, regional, and local population census figures) • Land registry: maps of titled indigenous lands • Ministries of forestry / agriculture /natural resources / environment (as applicable): maps of formally designated areas for community use (such as community or communal reserves, extractive reserves, community forests, community conservation areas etc.) • Additional relevant government ministry sources • Socioeconomic reports and past land use plans or strategic development plans	5 and 6
Publications of national / regional cultural institutions	6
Results of prior participatory mapping exercises	4, 5 and 6

Information source or topic to investigate (e.g. through literature review, lists, consultation)	Useful for understanding which HCV(s)
Maps of linguistic distribution (e.g. ethnologue, terralingua) and maps showing distribution of different ethnic groups	5 and 6
Global Platform of Indigenous and Community Lands: **www.landmarkmap.org**	5 and 6
UNESCO cultural World Heritage sites: **https://ich.unesco.org/en/lists**	6
National directives concerning archaeological sites and resources	6
Consultation with anthropologists, historians, archaeologists, museums, and databases for identification of sites of global or national significance	6
UNESCO Atlas of the World's Languages in Danger: **www.unesco.org/languages-atlas/index.php**	5 and 6

ANNEX 2: HOW SCREENING CAN HELP FACILITATE SITE-LEVEL HCV IDENTIFICATION

Unlike an HCV screening, which focuses on estimating the probability of HCV presence, an HCV assessment strives to definitively confirm the presence or absence of HCVs whenever possible. Screening provides an overview of the landscape, but as the assessor moves to a site assessment, they zoom in, collecting and reviewing data in considerably more detail. This section describes how HCV screening results should be used to assist with subsequent site-level assessments.

ENSURING CONSISTENCY – OVERALL PICTURE OF THE LANDSCAPE

In landscapes where there are multiple industrial land users operating, a screening exercise would be a powerful tool. This should be used for both aligning the sustainability objectives of all parties and ensuring comparability and consistency among the site-level assessments. Screening will allow significant efficiency gains, whereby assessors undertaking site-level work can leverage off the datasets, methodologies, and outputs from the screening. Where there are multiple site-level assessments undertaken within a landscape, consistent methods, and subsequent identification of HCVs among the site-level assessments is extremely important. Using the screening results as a base dataset provides a means of assuring consistency.

The land cover map is a key dataset for screening and site-level assessments, though the level of resolution in the land cover map would be lower for screening than required for site-level assessments. The site-level land cover map must be compared with or verified against the screening maps. The site-level map would be produced with more detail and updated for landcover changes that may have occurred since the generation of the screening map. Next, the land cover map is combined with secondary data such as the spatial plan, topography, protected areas, ecosystem types and infrastructure. At a broad scale, this will enable the identification of such things as:

- Areas which contain high levels of biodiversity or migration corridors between natural areas.
- Natural areas that are threatened by development (e.g. zoned for agriculture and are on flat or accessible land).
- Highly degraded areas or areas being degraded quickly (e.g. mines where tailings are spilt directly into rivers).

Site-level assessment would describe these areas in more detail but should be consistent with the description in the screening. Another important factor is that the screening land cover map would define the land cover classifications (and their definitions). The site-level land cover maps must use the same classifications. This is important because this would enable direct comparability among site-level assessments within the landscape.

DATA SHARING

Common participants in a screening would include government, companies, NGOs, and communities. Each party would have knowledge and either formal or informal data that it could bring to the site-level assessment.

Table 1. Common participants in a screening and the data they could share.

Potential Screening Participants	Data the participants could potentially share
Government	• Current spatial plans • Changes to spatial plans and development plans for the landscape • Current industrial development applications • Land suitability studies • Census
Companies	• Concession boundaries • Development plans • Historic land cover • Past management and monitoring data • Social and Environmental Impact Assessments
NGOs	• Social or biodiversity project data
Community	• Species sightings • Threat-related information (e.g. flood, drought) • Changes to the environment (e.g. changes in the size of fish catches) • Land use information • Resource availability / resource use

With site-level assessments, companies rely on third parties for information, which is generally obtained through stakeholder consultations. A deeper level of involvement by all parties in a screening would result in more ownership of the information. If the data were shared openly, the combined dataset would be very useful as a contribution to screening. Though the project initiator should also be aware that some of the parties may not legally be able to share data, despite their best intentions. In which case the screening project would have to proceed with publicly available data. One of the important points that would need to be decided at the time of screening project initiation should be how the report and underlying data could be shared. It will require an agreement which specifies:

- What input data will be provided and by whom.
- How the data is to be used (i.e. the content of the report that will be generated and who will have access to the report).
- How / where the data will be stored.
- Rules that govern how the data can subsequently be shared with third parties.
- Ideally, the screening report would be a publicly available document, so that newcomers to the area could leverage off the data generated.

DOCUMENTATION OF METHODOLOGY

It is crucial that the methodology for undertaking the screening is well documented so that third parties, which subsequently use the data can understand the level of rigour with which the data was prepared. Typically, the quality of land cover mapping is subject to much scrutiny. If only poor-quality images were available for generation of the screening landcover map, areas that are difficult to classify will require increased focus on mapping during the site-level assessment.

Documenting the level of verification that has taken place is very important. One potential way of verifying the screening is to ground-truth the screening results. For example, an area which is mapped as being both HCV 1 and HCV 4 is ground-truthed by an assessor to determine whether the screening results match the reality on the ground. Associated with this is well-documented justifications for the mapping of the various HCVs. Some areas may be clear HCVs, whereas other areas often require a strong justification. It is important that a third party understands the reasoning.

LONGEVITY OF THE SCREENING RESULTS

One issue to consider is: “How long do the screening results remain relevant or valid?” This of course depends on how quickly the landscape is changing. There are several variables to consider:

- Conversion of forest areas to agriculture.
- Changes in government policy (e.g. A new spatial plan may rezone forest areas to agriculture resulting in a swathe of agricultural development).
- Changes in commercial crops (e.g. transition from rubber to oil palm).
- Opening of artisanal mining activities which wash large volumes of silt down rivers.
- In some areas of the landscape, the screening results (e.g. maps) may be obsolete in 5–10 years, whilst in areas which are less threatened by development the results could remain relevant for decades. When assessing the screening data for a subsequent site-level assessment, it is important to overlay the satellite image that was used for the screening with a current image. Areas where land cover change has taken place should be the focus of remapping and the focus of the threat assessment.

HOW SCREENING OUTPUTS CAN BE USED IN SITE-LEVEL ASSESSMENTS AND LIKELY FOLLOW-UP ACTIVITIES THAT WILL BE NEEDED

NB: Site-level HCV assessments will always require verification or ground truthing of the screening results.

Table 2. How screening outputs can be used in site-level assessments and likely follow-up activities that will be needed

	Potential screening outputs	How it can be used in site-level assessments	Verification and follow up activities that will likely be needed
Image Analysis and Land Cover Mapping	Landcover mapping will involve: 1. Sourcing recent satellite imagery over the geographic scope of the screening. 2. Determining appropriate land cover classifications and describing the land covers. For forest areas, these descriptions would have to be developed for each of the categories based on the forest descriptions in the area. Highlighting RTE species that are present in the various forest types. Also, land cover categories would have to be matched to the national land cover categories. 3. Mapping the landcover across the geographic scope of the screening.	The landscape-level land cover map would be a valuable starting point for the site-level landcover map. Remapping would have to be done at a larger scale because (1) the time difference between the mapping at the landscape versus the site-level and (2) the different scale at which the mapping is done. The screening map would probably be suitably accurate for use in a site-level scoping study. Furthermore, any ground truthing that was done during screening could be supplemented by site-level ground truthing.	There are several verification options. For example: • In some areas recent high-quality imagery may be available. Verification points can be taken from the high-quality image and compared with the image used for screening. • Verification against known locations or physically visiting several separate points (ground truthing). • In some cases, site-level assessment mapping may have already been done. The screening map could leverage off the site-level mapping and land cover classifications.
HCV 1	Much of the individual RTE species range data is not terribly accurate. Consequently, identification of HCV 1 at screening level will be based on interpretation of the landcover map combined with secondary data (e.g. protected areas, riverine forest, IFL).	Provided the landcover map is accurate, all high probability HCV 1 areas identified at screening should be able to be identified as HCV 1 at site-level. Much of the survey effort for HCV 1 will be on mapping the marginal (or low probability) HCV 1 areas.	The focus of verification will be : • Ensuring the accuracy of the land cover map. • Where HCV 1 areas were mapped based on the assumed presence of RTE species. It should be confirmed that those species are present. • In areas where forest cover is fragmented or based on an assumed presence of a corridor or stepping stones, it should be verified that the corridor / stepping stones are being used by mammals or birds.

	Potential screening outputs	How it can be used in site-level assessments	Verification and follow up activities that will likely be needed
HCV 2	Identification of HCV 2 is based on IFLs as well as landscape-level ecosystems. IFL is a secondary data set and is directly applied to the landscape-level mapping. Identification of the landscape-level ecosystems involves using the landscape-level landcover map. But will require augmenting it with secondary datasets where the ecosystem extends beyond the landscape. Regarding species that require very large areas of natural forest to maintain themselves, these are usually keystone species (e.g. elephants, orangutans) and their presence in forest areas is usually known.	The work done at landscape-level should be able to be applied directly at site-level. However, mapping of HCV 2 areas will need to be adjusted based on the site-level landcover map.	Where the mapping of HCV 2 was contingent on the presence of wide-ranging species; the presence of these species needs to be confirmed. This can usually be done by interviewing people that live on the borders of these forest areas. Additionally, the quality of the ecosystem needs to be confirmed. Highly degraded areas must not be included in HCV 2. So, the extent of HCV 2 areas must be verified on site or through examination of high-quality imagery.
HCV 3	Analysis related to ecosystem mapping could be developed at the landscape-level and applied at the site-level. The Indonesian HCV NI gives an analytical approach which enables RePPProT data to be analysed over a large area and intersected with the forest cover map to define endangered ecosystems. Similar approaches are described in other HCV NIs. This analysis could be done at a landscape-level and then used directly in site-level assessments.	Work done at landscape-level, where RTE ecosystems are identified should be able to be used directly. However, mapping of the ecosystems would have to be used in conjunction with the site-level landcover map.	Generally, ecosystem mapping is done at a broad scale. Consequently, accuracy of the broad scale maps must be verified when mapping RTE ecosystems at the site-level. For example, an ecosystem that consists of peat swamp forest, must be verified at site-level to confirm the presence of peat swamp forest.

	Potential screening outputs	How it can be used in site-level assessments	Verification and follow up activities that will likely be needed
HCV 4	Analysis related to slopes, peat, and rivers / swamps /lakes. The detail / accuracy of river data varies considerably and much depends on the definition of a river (e.g., how wide does a river have to be before it is considered a river, are man-made canals considered to be rivers, are ephemeral streams considered rivers?). Bearing in mind that in meander belts the course of rivers varies considerably over time. Slope data is derived from Digital Elevation Models, though these underestimate slope. The larger the pixels, the more slope is underestimated. For peat, at the landscape-level, this will rely on secondary data sources. The output of this will be identification of water bodies, steep slopes, and peat with the appropriate buffers around them.	Mapping of HCV 4 based on secondary data would be a good starting point and would then be augmented by site-level mapping of the various elements of HCV 4.	• Rivers would have to be verified in the field and with the aid of satellite images. • Slope data derived from the DEM would highlight steep areas. But these require field verification. • For peat, verification can be done by examining satellite imagery and identifying the areas where peat is likely to occur in comparison with the maps of its actual location. This will have to be augmented with field verification, bearing in mind that thin lenses of peat will disappear rapidly once the area has been drained.
HCV 5	HCV 5 requires detailed social surveys and does not lend itself to identification at screening level. However, based on data obtained from the social context, assumptions can be made about the communities' reliance on natural resources. E.g. if the communities are known to rely on river water, fish, and timber as natural resources. This could justify the forest areas within a certain distance being mapped as higher probability of HCV 5. Similarly, the water bodies where fish live and breed and the associated buffers could be mapped as high probability of HCV 5.	The contextual data and any indicative maps of HCV 5 at screening level would be a good start for the site-level assessment. This could be refined and tested with interviews to confirm the HCV 5 values had been correctly identified.	• Interviews and participatory mapping at the village level will reveal the reliance on natural resources. This will enable assumptions made at screening level to be tested.

	Potential screening outputs	How it can be used in site-level assessments	Verification and follow up activities that will likely be needed
HCV 6	Global HCV 6 - significant national or international cultural sites can easily be mapped and values are described in secondary data. Local HCV 6 requires detailed surveys and does not lend itself to identification at screening level.	Most HCV 6 sites will be obtained by community consultation.	Participatory mapping Consultation
Social Context	The output is a description of the broad social context in the area.	Much of the broad social context that is developed for the screening could be shared with the site-level assessments. Examples of this would be land use in the area, level of reliance on natural resources, main industries in the area and development plans for the area.	Participatory mapping Consultation
Threat Assessment	An important source of information about threats is the stakeholder engagement. The mapping of the locations of the threats could be obtained from analysis of satellite images.	Many of the threats identified at screening level would also be applicable at site-level.	Some threats could be verified from a time series of satellite images. For example: • Mining in rivers showing an accumulation of piles of silt downriver from the mine site. • Fire – showing the extent of burn scars. • Encroachment into protected areas. • Development of industrial agriculture. • Other threats may have to be verified at site-level. For example: • The effect of deforestation on fish stocks in rivers could be estimated by interviewing fishermen about the size of catches over time.
Stakeholder Engagement	Some stakeholders will be operating at a landscape-level. Examples of this are : • Wildlife Agencies (dealing with Human - Wildlife conflict) • Government Agencies (e.g. issuing development licenses) • Community Initiatives (e.g. associated with fire prevention / control, mangrove planting) Consequently, the information stakeholders provide will be at a landscape scale.	Results of the stakeholder engagement can be used for site-level assessments.	This will require additional information to be obtained from local stakeholders.

ANNEX 3: GUIDANCE FOR COMBINED HCS FOREST LARGESCALE MAPPING AND HCV SCREENING

BACKGROUND ON HCS FOREST LARGESCALE MAPPING

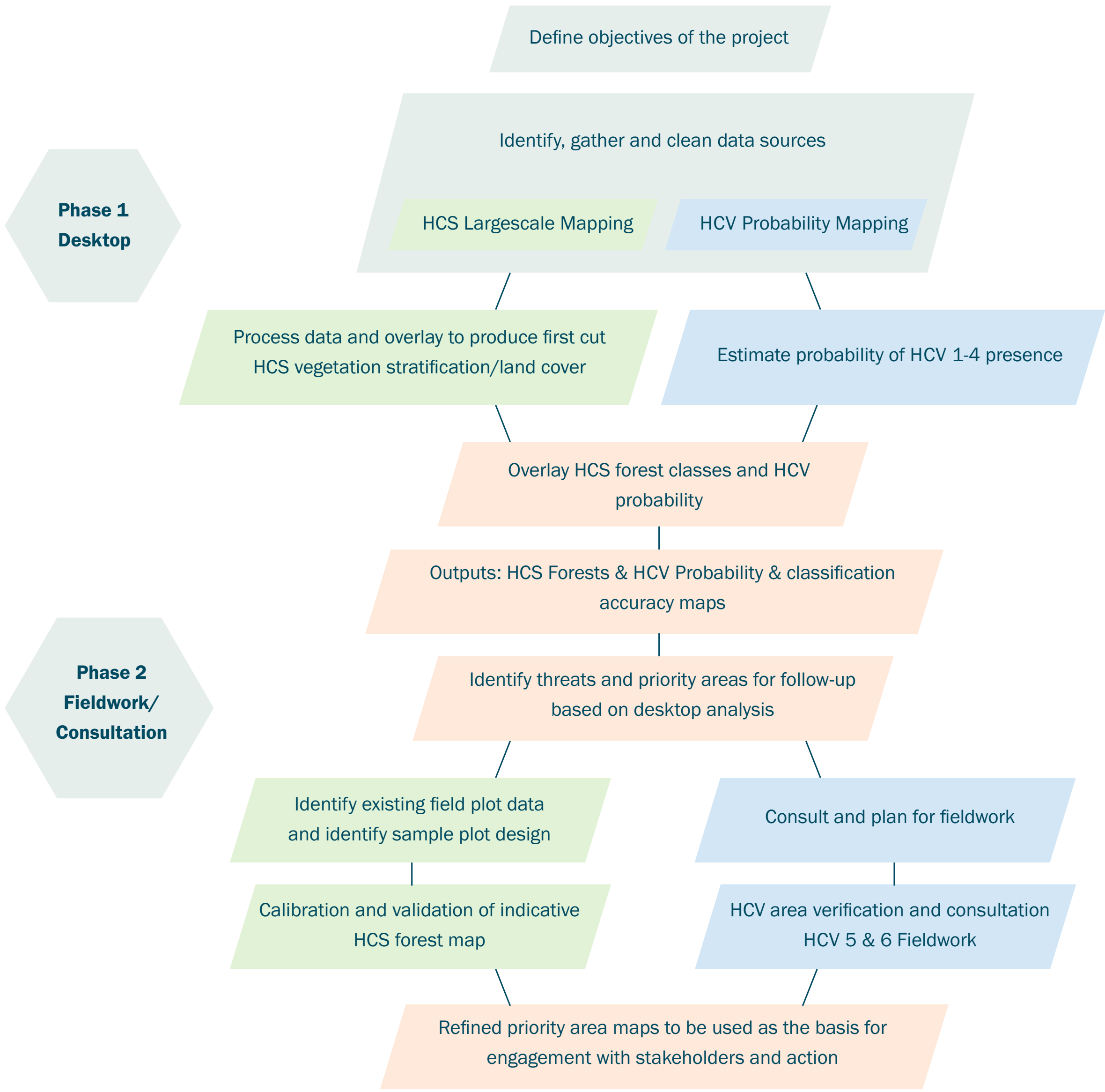
Background

The objective of this section is to provide guidance for when HCV screening is done in conjunction with High Carbon Stock (HCS) forest mapping at the landscape or jurisdictional scale. The HCS Forest Largescale Mapping Framework[8] has been developed and trialled in a variety of commodity sectors and landscapes with the objective of producing indicative maps of HCS forests at a 1:50,000 resolution. The HCS LMF includes use of the HCV approach as an important part of its land use conservation planning decision tree and refers to the HCV screening methodology. This section provides an outline of methods and guidance on where areas of overlap exist in creating indicative maps for HCV areas and HCS forests. Further guidance on implementing HCSA LMF is being developed by HCSA.

There will often be overlaps between HCV areas and HCS forests, for instance where HCS forests harbour concentrations of biodiversity, provide ecosystem services or provide critical livelihood resources. Coordinating the use of both approaches brings efficiencies (e.g. when data can contribute to both HCV area and HCS forest identification results and stakeholder consultation can be done simultaneously). By using both approaches together – companies, conservationists, and other stakeholders can aim to identify and conserve more of the potential values present.

[8] Referred to as the HCSA LMF (large-scale mapping framework) through the rest of this section.

Figure 1 . Workflow for the joint application of HCV (1-4) and HCS forest mapping a landscape scale.



INDICATIVE HCS FOREST MAPPING METHODS

Indicative, or large-scale HCS forest mapping is a scaled-up analysis of plot-scale HCS forest mapping and has many of the same considerations as when scaling up site-level HCV assessments. This procedure is used to generate indicative largescale HCS forest area maps using approved remote sensing techniques and spatial data analysis using GIS. The maps will be precautionary (i.e. in case of doubt an area will be classified as HCS forest/HCV area) through identifying potential HCS forest. The target resolution for these maps is 1:50,000 with separate HCS vegetation stratification for each category **(Figure 2).**

This guidance document and the HCSA LMF is designed to provide structure to projects implementing these methods without being too prescriptive about data sources, processing techniques or algorithms as these factors will change depending on data availability, the landscape, and the resources available.

STEPS FOR LARGE-SCALE INDICATIVE HCS FOREST MAPPING

PROCEDURE

Phase 1:
The phase 1 process involves collecting necessary data sources and preparing them for analysis. While this phase of HCSA LMF can be strictly a desktop exercise the input of field vegetation plot data is essential for determining forest structure classifications, as well as validation of those classifications which happens in Phase 2. This vegetation plot data can come from different sources such as previously conducted plot-scale HCS or HCV-HCSA assessments or other forest structure data collection. In many cases the analysis can be done in conjunction with fieldwork as it is important to make sure the classification thresholds for different forest structure categories match the forest in the landscape being assessed.

STEP 1: IDENTIFY AND CLEAN DATA SOURCES

The HCS forest stratification process requires specific satellite imagery and terrain data for forest classification. While many different datasets and tools have been and are being trialled, the basic process can be done with publicly available satellite data. In addition, national or regional forest maps, global forest change datasets and other environmental information which overlaps with the data requirements for HCV mapping (See Annex 1 of this document).

BOX 1. EXAMPLE OF INFORMATION/ DATA SOURCES TO BE USED DURING HCS FOREST MAPPING

Remote Sensing Data

- Shuttle Radar Topography Mission (SRTM)
- Sentinel 1 radar
- Sentinel 2A & 2B optical
- Landsat 4,5,7,8
- Private satellite imagery (e.g. Planet, WorldView, SPOT)
- Private radar imagery (RadarSat-1 & 2, TerraSAR-x/TanDEM-x)
- NASA GEDI
- LiDAR data

STEP 2: PROCESS DATA AND OVERLAY TO PRODUCE FIRST CUT VEGETATION STRATIFICATION/LAND COVER

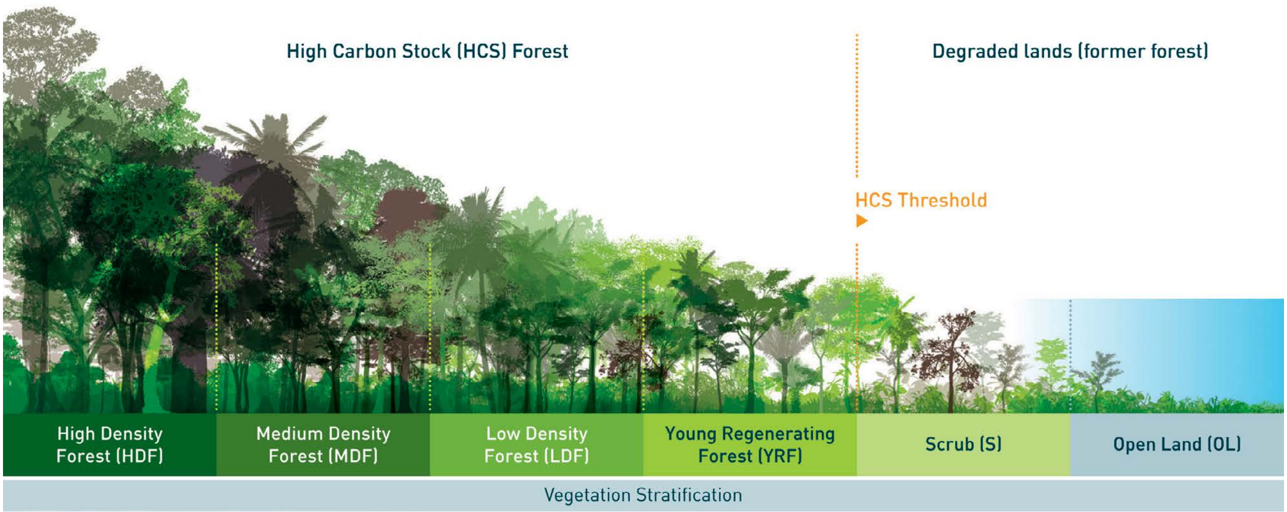
The pre-processing and clean-up of satellite imagery is necessary so it can work together in classification tools. It can be challenging to get consistent cloud-free satellite imagery for many areas of the tropics, and it is necessary to use imagery collected on different dates and from different sensors to develop a complete dataset for a landscape. The processing steps required will depend on the data available, the quality of imagery, and the classification techniques being used.

- Process data through various clean-up and conversion techniques depending on type of data, including:
- unsupervised pixel analysis (green cover, textural analysis, leaf area index, chlorophyll, NDFI (composite indicator))
- auto correction for cloud cover and other ‘noise’
- filtering of outliers and low-quality data
- radar vegetation cover analysis
- Conduct secondary analysis to refine potential differences in vegetation structure including
- time series analysis to detect vegetation structural changes such as regrowth rates or subcanopy clearing
- machine learning analysis of vegetation classes
- other supervised and unsupervised classifications

STEP 3: OVERLAY HCV LAYERS AND OTHER CONSERVATION AND LANDCOVER CLASSES

Areas that are identified as high probability of HCV will not receive further HCS forest cover analysis as they are automatically identified for protection. Examples of these areas include:

Figure 2. Diagram showing the different levels of HCS forest classification.



- Karst areas
- Peat land areas (HCV 3 & 4)
- Intact Forest Landscapes (HCV 2)
- Steep slopes/ high erosion risk areas (HCV 4)
- Connectivity to existing conservation areas and intact forest landscapes
- Habitat for key species (orangutan, tiger, etc. depending on context)
- Protected areas

Maps of developed areas such as villages and settlements as well as existing industrial plantations should also be included as data layers, as these will be generally considered development areas. The classification and processing maps from Step 1 are combined with conservation areas and with the areas with probability of HCV. The output at the end of phase 1 is a landcover map of indicative HCS forest categories and indicative HCV areas. These maps are the basis for planning field data collection, site visits, and stakeholder consultation.

Phase Two:
After the initial HCS forest classification is complete, fieldwork is essential to ensure that the classification and conservation maps reflect the reality on the ground. This field data is used to both refine the accuracy of classifications conducted in Step 2 as well as provide an accuracy assessment of the classification.

STEP 4: IDENTIFY EXISTING FIELD PLOT DATA AND IDENTIFY SAMPLE PLOT DESIGN

Field plot data collection needs to be planned to ensure that representative data is collected about forest categories, particularly on either side of the decision boundary between YRF and scrub as these categories change between different landscapes and forest compositions.

- Existing field plot data cleaned and processed.
- Field plot sample design for remaining areas with a focus on locating plots in LDF, YRF and Scrub classes.

STEP 5: CALIBRATION AND VALIDATION OF INDICATIVE HCS FOREST MAP

Before a largescale HCS forest map can be finalised, indicative HCS forest maps need to be validated based on procedures set out in the HCSA toolkit v2. This process ensures accuracy of the mapping process for the given landscape:

- Using plot data and other field data, through machine learning or other standard techniques.
- Revised indicative HCS forest map produced (with indicative HCV layers as well).

After calibration and validation, the maps are ready for public consultation of draft results.

EXPECTED OUTCOMES AND REPORT TEMPLATE

An integrated HCS/HCV largescale mapping or screening project will produce at minimum indicative HCS forest and HCV maps and classification accuracy tables. Reporting of results should follow the draft reporting template (see Step 6 of this document) and be written up in an integrated way.

EXAMPLE APPLICATIONS OF COMBINED INDICATIVE HCS FOREST/HCV MAPPING AT SCALE

EARTHWORM - GHANA, ENCHI

In 2019 Earthworm led an assessment of High Carbon Stock (HCS) and High Conservation Value (HCV) under the Cocoa & Forests Initiative (CFI) Joint Framework for Action – in Ghana to test the methodologies of largescale HCS forest mapping and HCV screening in a smallholder- dominated cocoa production landscape to identify areas for improving the methodologies and develop learnings to apply to other cocoa production regions of the world. This analysis was done in an area of ~61,000 ha and focused on identifying HCS forest classes and animal biodiversity and ecosystems (HCV 1 - 4). The project was designed to identify where these values exist on Lindt & Sprüngli partnered farmer land. The Enchi area was selected as there is evidence of past forest lost, a concentration of supply from this area, and existing initiatives to support farmers.

Combining the HCS forest classification with HCV area identification in consultation with stakeholders and local communities, as well as the Proforest HCV Probability map resulted in a comprehensive conservation prioritisation map that identified 1,774.6 ha of HCS forests and 393.4 ha of HCV areas within the Enchi landscape. Some lessons learned from this trial are that field level protocol development is critical both for verification of indicative HCS and HCV probability maps. Specifically, that effort needs to be put into adapting HCS forest classifications to the landscape. Dialogue with local stakeholders also revealed the presence of rare amphibians in some small forest patches that the landscape HCV probability maps were too coarse to identify and would not have been included in a decision tree if an HCS assessment alone had been conducted. That collaboration with local farmers to identify additional inputs on forest types, HCV areas, and land tenure is critical as the combined results can be used by stakeholders to build awareness and possible joint action to conserve identified values. This trial and the lessons learned help to provide feedback and examples of the implementation of combined HCS forest mapping and HCV screening on a regional or jurisdictional scale.

USAID LESTARI - PAPUA

USAID LESTARI has experience applying the HCV approach at the landscape-level as an entry point for improving spatial planning in Mappi and Bouven Digoel districts, Papua, Indonesia. LESTARI supports the Government of Indonesia (GoI) to reduce greenhouse gas (GHG) emissions and conserve biodiversity in carbon rich and biologically significant forest and mangrove ecosystems. LESTARI applies the landscape approach to reduce GHG emissions, integrating forest and peatland conservation with low emissions development achieved through improved land use governance, enhanced protected areas management and protection of key species, sustainable private sector and industry practices, and expanded constituencies for conservation among diverse stakeholders in the landscape in which it works.

The core initiative in the Mappi - Bouven Digoel landscape was to rationalise the spatial plans that were heavily skewed towards development of oil palm plantations and extractive wood industries, and significantly lacking in conservation areas. A landscape scale HCV assessment was implemented to identify priority areas for conservation of biodiversity, environmental services, community needs and cultural values. In-depth HCV assessments over an area in excess of 4.5 million ha would have been prohibitively time consuming and costly. Therefore, indicative HCV 1-4 were identified through mapping land cover from existing secondary data augmented with up-to-date satellite images, and then combined with field assessments with experts from several Papuan Universities, WWF-Indonesia, local government and non-government partners, in key locations chosen for their ecosystem potential and level of threat from proposed development. HCV 5 and 6 were indicatively identified throughout the districts by intensive participatory mapping and group discussions over several months with representatives of all indigenous communities that claim traditional rights. The results of the indicative landscape-scale HCV identification were then thoroughly consulted at the district level through inclusive, participatory, stakeholder consultations for inputs and corrections.

The landscape HCV assessment was subsequently used by multi-stakeholder forums facilitated by the project, to identify areas of potential “sustainable development conflicts” and develop solutions to address these issues within a “Landscape Conservation Plan” (LCP). The LCP analysed threats to HCVs within the landscape and assigned priorities for conservation based on these levels of value and threat. The LCP also elaborated strategies and focus of management to maintain and enhance important values within the landscapes. Through the development of the LCPs for Mappi and Bouven Digoel, the understanding and justification for conservation of priority HCV areas within the districts was greatly enhanced.

With support from local government agencies as well as local NGOs, LCPs that prioritised areas for conservation were used as substantive input during the Strategic Environmental Assessments and the Spatial Planning for the districts. Through this quite lengthy process with its origins firmly planted in landscape-scale HCV assessments (i.e. screening), over 1.5 million ha of important habitat and forest in Papua is now proposed for conservation or improved forest management with full support from local stakeholders and government under the district spatial plans, and will therefore not be available for plantations or other destructive development in the future.
www.lestari-indonesia.org/en/lestari-project/

BMZ - KAPUAS HULU, WEST KALIMANTAN

Commissioned by the German Federal Ministry for Economic Cooperation and Development (BMZ) , GIZ is collaborating with the jurisdiction of Kapuas Hulu in West-Kalimantan, Indonesia, towards sustainable agricultural production that does not negatively impact forests and other valuable ecosystems. Palm oil and natural rubber are the two largest forest-risk commodities with supply chain links to the German market. In partnership with the district government, GIZ is applying a cross-commodity, jurisdictional approach to improve sustainability within the district and along the supply chain. In 2017 a multi-stakeholder platform was created at district level, bringing together local government, private sector and civil society to address several sustainability issues. Within this platform, various stakeholders identify sustainability risks and develop potential solutions to address these. As part of this work, GIZ commissioned a mapping study of the supply shed that shows the different kinds of land cover, land uses and risks to forests in the jurisdiction. This will be built upon with further groundwork and stakeholder engagement to help advance the progress towards implementation of a sustainable jurisdictional approach in Kapuas Hulu. From October 2019- October 2020, HCVRN coordinated an HCV screening combined with indicative HCS forest mapping in the district. The results will be available in a case study and examples from this screening exercise have enriched this updated guidance document.

ANNEX 4: EXAMPLES OF HCV INDICATORS AND PROBABILITY CLASSES

HCV 1 Species	Justification of likely species presence	Justification of likely suitable habitat presence	Probability of HCV 1 Presence
Sumatran Elephant (Elephas maximus sumatranus)	IUCN species range maps Studies with accurately mapped species distributions, supported by expert opinion	Accurately mapped suitable habitats (of adequate size) for Sumatran Elephant Flat-lightly sloped forest areas (preferred area for habitat/range) Large intact ecosystems Regenerating (degraded) forest areas that do not appear as forest in the land cover map, but potentially functioning as buffer for the core habitat areas Natural forest patches (e.g. >1,000 ha – depending on the country and level of forest cover), with buffer Protected Areas with buffer Connectivity corridors and stepping stones between large blocks of forests, even where forest quality is heavily degraded Rivers and associated riparian forests (especially where forest >100 m in width is present on either side of a river)	HIGHER
Sumatran Tiger (Panthera tigris sumatrae)	Information of presence from camera trap (coordinate of locations) Information of presence from consultation with expert.	Use of relatively medium to dense forest cover area, which the coordinates of presence are located, as proxy of main/core area where Sumatran Tiger depends on. Presence of naturally vegetated potential corridors between locations/forest pockets where presence the species are identified	HIGHER
Sunda Pangolin (Manis javanica)	IUCN species range maps Reference on historical presence of the species	Degraded forest and intensification of land use (conversion of land use for plantation) in the Sunda Pangolin range area. Long history of habitat (forest) degradation and deforestation. Long history of hunting.	LOWER
Sumatran Rhinoceros (Dicerorhinus sumatrensis)	IUCN species range maps Reference on historical presence of the species Studies with accurately mapped species distributions, supported by expert opinion	Degraded forest and intensification of land use (conversion of land use for plantation) in the Sunda Pangolin range area. Long history of habitat (forest) degradation and deforestation. Long history of hunting.	LOWER

HCV 2 Indicators	Justification of significance at regional, national, or global level, and/or presence of viable population of the great majority of the naturally occurring species	Probability of HCV 2 Presence
Intact Forest Landscape	Intact forest land cover identified through land cover analysis in the IFL area. Protection forest status from national land use designation covering certain parts/the whole IFL area. Globally recognised forested ecosystem.	HIGHER
Globally recognized ecosystem of forest-savanna mosaics	Long history of forest/land fire. Indications of extensive community-based agricultural activities (shifting cultivation). Presence of remnant forest/young regenerating forest patches.	LOWER
Relatively large extent of forest area derived from land cover analysis	Few indications of historical forest exploitation. Strong indications of customary forest status (located at indigenous community area). Intact forest land cover with size of ± 20,000 ha.	HIGHER
Relatively large extent of forest area derived from land cover analysis	Production forest status from national land use designation. Indications of extensive logging activity from remote sensing (e.g. indications of logging tracks in the forest and operational roads).	LOWER

HCV 3 Indicators	Justification of rarity and threat to the ecosystem	Probability of HCV 3 Presence
Peat swamp forest ecosystem	HCV Indonesia NI: Gambut Land System is categorized as rare and endangered ecosystem according to HCV Indonesia NI. Presence of relatively good secondary forest land cover. Indications of logging activity from the past can be found on satellite imagery. Size of the peat swamp forest area in the landscape/jurisdiction is significantly declining. National designation status of hydrological peat unit	HIGHER
Mosaic of heath ecosystem patches in peat land ecosystem	Insights from consulted expert: Presence of less dense vegetation cover patches over the relatively good secondary peat swamp forest, indicating presence of heath ecosystem patches. Size of the peat swamp forest area in the landscape/jurisdiction is significantly declining.	HIGHER
Borneo lowland rainforest on WWF Terrestrial Ecoregion Map	Long history of extensive logging, land fire, and land use conversion for agriculture. Most of the area is covered by shrub-young regenerating forest from land cover analysis.	LOWER

HCV 4 Indicators	Justification of function as basic ecosystem services and in critical situation	Probability of HCV 4 Presence
Rivers network and riparian areas	Presence of rivers in the landscape according to government database, comprise of 1 main river and 21 tributaries including the stream order class 2 and 3 (according to classic stream order classification). Most of the riparian areas are found as community agricultural area, while the other is in good condition (i.e. covered with natural/semi-natural vegetation land cover). There are several settlements of local people (i.e. indigenous and other settlers) located along the main river, and there is a capital city situated at the downstream end (coastal zone). As for precautionary, rivers are identified as the main source for consumable water and sanitation, and source of fish for protein. Hydrological system of the rivers network is controlling the flow regime. It is protecting the capital city from flood. Riparian areas are defined as protection zone according to government regulation.	HIGHER
Hills complexes with large coverage of steep area **Topographic analysis using DEM data Protection zone of steep area according to government regulation.** **National Soil Map** **Land cover classification**	Presence of steep area which falls into category of protection zone for steep area (e.g. erosion and land slide) according to government regulation. Presence of natural and semi-natural (agroforestry or semi natural mixed agriculture farm) land cover in/at the steep area protection zone. Hills complexes are functioning as water catchment area in the landscape.	HIGHER
Hilly area with scattered patches of steep area	Most part of the hilly area are below the threshold of steep area protection according to the government regulation. Soil type in the hilly areas are not prone to landslide. Average yearly rainfall is categorized into low-medium. Potentially functioning as water catchment area.	LOWER
Shallow peat swamp area at the lowland part of the landscape/jurisdiction **National hydrological peat unit** **National Soil Map and land system classification** **Land cover classification**	Peat areas are typically with shallow layer of organic matter according to the land system map. Most of the peat area has been converted and managed for agricultural plantation for more than 20 years according historical land cover analysis. Strong indications of drainage lines from the satellite imagery. Very likely have lost its nature and function to store and retain water.	LOWER