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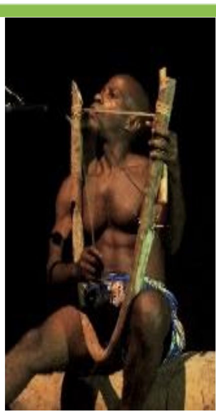

« Key Expert Meeting on HCV 2 and 3»

Meeting Report

September 21 to 23, 2016
Montpellier, France

FORESTS FOR ALL FOREVER™

Report

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CONTENTS

TABLES AND ILLUSTRATIONS

ABBREVIATIONS AND ACRONYMS

COMIFAC
Commission des Forêts d'Afrique Centrale
CIRAD
Centre International de Recherche en Agronomie pour le Développement
FMU
Forest Management Unit
FSC
Forest Stewardship Council
FRM
Foret Ressources Management

HCV-RWG
High Conservation Value Regional Working Group
HCV
High Conservation Values
IFL
Intact Forest Landscapes
IGI
Internatinal Generic Indicators
IUCN
International Union for the Conservation of Nature
KfW
Kreditanstalt für Wiederaufbau
OSFAC
Observatoire Satellital des Forêts d'Afrique Centrale
PPECF
Programme de promotion de l'exploitation certifiée des forêts
WCS
Wildlife Conservation Society
WWF
World Wildlife Fund

ACKNOWLEDGEMENTS

The Forest Stewardship Council would like to thank all the experts who have participated at and who have contributed to this fruitful meeting. We would like to express our gratitude to the research unit Forest and Societies for having received us in their offices at CIRAD Baillarguet in Montpellier. In particular we would like to thank all the participation who have committed to further support the process of defining HCV 2 and 3 for the Congo Basin by producing products relevant for such process. FSC would like to thank Valery Gond and Sylvie Gourlet-Fleury for their willingness and enthusiasm to share and improve the vegetation cover data in order to use it to define ecotypes, a first map of which will be produced by Hedley Grantham and Aurélie Shapiro. Hedley Grantham for having ran preliminary simulations with Zonation and Marxan to demonstrate the value of this tool for a potential application for IFL core zone planning, Barbara Haurez and Frederic Mortier for their interest to produce a forest maturity index and a related map that could feed directly into such planning.

1. INTRODUCTION

In 2013, the FSC Congo Basin office with the help of the German consultancy firm GFA set up a program of activities ("Road Map") that targets the development of clear and precise guidance on how to identify, manage and monitor High Conservation Values for the Congo Basin's forests. With the financial support of the Commission of Central African Forests (COMIFAC) through its Programme for Promotion of Certified Logging (PPEFC) funded by the German Development Bank (KfW), the FSC Congo Basin office launched the roadmap project in December 2015 with the establishment of a High Conservation Values Regional Working Group (HCV-RWG), a group mandated by the FSC initiative to take decisions regarding the FSC HCV guidance. HCV mainstreaming is part of a more general effort to harmonize forestry certification procedures in the sub-region, and in particular the ways of identifying and managing HCVs. It targets the countries in which the Program PPECF is active, *i.e*. Cameroon, Democratic Republic of Congo (DRC), Gabon, Republic of Congo and Central African Republic (CAR).

The expected output of the project is **a Regional HCV Guideline for the Congo Basin and National HCV Indicators for the Identification, the Management and the Monitoring of High Conservation Values in the Congo Basin**. The guideline should help those involved in forest management and particularly FSC certificate holders or timber companies engaged in a FSC certification process to overcome current weaknesses and difficulties in the identification/management/monitoring of HCVs within their Forest Management Units (FMUs). Thereby, a particular difficulty is the identification and management of HCVs at the management unit level in such a way that is contributes to the maintenance of landscape level HCVs captured under HCV 2.

"Intact Forest Landscapes" (IFLs) defined as "*road-less space larger than > 500 km2 in area, with a minimum width of 10 km and that lies outside a buffer of 1 km from any road or settlement"* are one indicator of HCV 2, which is defined as "*Intact forest landscapes and large landscape-level ecosystems and ecosystem mosaics*" in the latest version of FSC's International Generic Indicators (version 1.1, validation still pending). To better protect IFLs, the FSC members passed a motion (Motion 65) during the last FSC General Assembly (Seville, Sept. 2014). The motion requires FSC to develop, modify, or strengthen indicators to protect the vast majority of IFLs.

Due to particularities inherent to each of the main IFL areas (Brazil & Amazon, Canada, Congo Basin and Russia), the development of such indicators needs to be addressed regionally and specific sets of indicators to manage IFLs need to be developed for each impacted country. In the Congo Basin the HCV-RWG has been tasked to develop the regional indicators as part of the HCV guidance development, adding a new level of complexity to the guidance development. The regional indicators will consecutively be interpret by each already established National Standards Development Group (Cameroon, DRC, Gabon, RoC) and integrated into the National FSC Standards.

The pressure to develop regional standards is high, if acceptable standards cannot be developed by January 2018, 80 % of the IFL area in FSC forest management certified FMUs has to be set aside as so called "core areas". Alternatively, if justified by the regional and national contexts, and if appropriate and approved indicators are available, such core areas can be defined to be smaller. Therefore, indicators for the identification of core zones are urgently needed to ensure continued viability of FSC forest management in the Congo Basin.

For 2016, the goal of the roadmap project is to develop the guidelines for **the identification** of HCVs 1 to 6 and, in relation to Motion 65, to **define the approach to identify, manage and monitor HCV 2**, with includes the more recently added IFL concept. The cornerstones to achieve this goal are three workshops with the HCV-RWG in 2016, during which the group discusses and takes decision regarding the development process and the content of these guidelines. These meetings, and the work in between meetings, are coordinated by the FSC HCV Congo Basin Officer. The set of indicators for IFLs need to be submitted to FSC's PSU by the first quarter of 2017 in order to be examined.

During the first HCV- RWG's workshop from 15 to 18 June in Brazzaville, the HCV-RWG commissioned the FSC HVC Officer to do a review of the existing national HVC interpretations and HVC assessments in certified concessions relevant for the Congo Basin and to develop a first draft of the regional HCV guidelines. Where those documents did not provide for any good propositions, the HCV-Officer consulted other guidance documents and scientific publications. Based on the study of these documents the FSC HVC Congo Basin Officer has compiled proposals for the identification of HCVs 1 to 3, including a proposal for an approach to determine core areas for the protection of Intact Forest Landscapes.

Looking at the indicators and methodologies proposed to identify HCV 2 and 3 and the evaluations of HCV 2 and 3 in the studied documents the HCV-Officer observed the absence and the need for a standardized approach to evaluate HCV 2 and 3. Other guidelines and scientific publications provided, however, some ideas and components for such approaches. To discuss and substantiate the elaborated propositions for the evaluation of HCV 2 and 3, the HCV-Officer deemed it necessary to consult with the experts of the relative components. Therefore a meeting in Montpellier was arranged.

1.1. APPROACHES EXPLORED TO IDENTIFY HCV 2

1.1.1. HCV 2 Indicators

HCV 2 are designated by vast relatively undisturbed ecosystems and ecosystem mosaics, which can sustain viable populations of most naturally occurring species and (implicitly) most other environmental values in these ecosystems (HCV Resource Network 2013). In other words, an HVC 2 denotes an intact ecosystem or ecosystems mosaics vast enough to maintain this integrity in the long-term. The identification of HCV 2 targets the delimitation of areas that contain such ecosystems or ecosystem mosaics.

In practice, ecosystem processes are too complex and the number of species is too important to identify and assess ecological integrity directly (Andreasen, O'Neill, Noss, & Slosser, 2001; Wiens, Hayward, Holthausen, & Wisdom, 2008). Therefore, indicators are often used to do so (Andreasen et al., 2001; PARRISH, BRAUN, & UNNASCH, 2003; Wiens et al., 2008). Indicators are generally described as "a parameter [a property that is measured and observed], or a value derived from a parameter, which points to, provides information about, describes the state of phenomenon/environment/area, with its significance extending beyond that directly associated with a parameter value" (OECD, 1998). Environmental indicators are, therefore, a vehicle for summarizing, or otherwise simplifying, and communicating information about something that is of importance to environmental decision-makers (Moxey, Whitby, & Lowe, 1998). Indicators, thus, reduce the number of measurements and parameters that normally would be required to give an 'exact' presentation of the situation. They should (in theory at least) provide managerially significant information about patterns or changes in the state of the environment or changes in human activities that affect the environment (Meul, Nevens, & Reheul, 2009).

Often used examples of ecosystem integrity indicators are large predators. Studies have shown that large predators are good indicators of the general condition of an ecosystem because they are often the first to disappear in a disrupted system, because of their sensitivity to changes in vegetation and landscape structure and composition, and to many other factors such as eutrophication, unsustainable resource harvesting and excessive use of toxins that accumulate in the food chain (Sergio et al. 2008).

The generic guidelines for HCV identification also mentions proximity or presence of areas having been identified by other institutions as having high conservation value (for example, RAMSAR sites, IBA, PAs), habitat condition, structure and connectivity, ecosystems that contain important sub-populations of wide-ranging species (e.g. leopards and elephants) and the intensity of human pressure as indicators for HCV 2 (HCV Resource Network, 2013).

Following the motion 65, the Intact Forest Landscape concept has been included in FSC's new International Generic Indicators (IGI) in the HCV 2 definition and as a strict indicator of HCV 2 (FSC, 2016). The IGIs define an IFL as an area located in an existing forest area that is home to forest and non-forest ecosystems, minimally influenced by human disturbance with a minimum surface of 500 km2 (50 000 ha) and a minimum width of 10 km (measured as the diameter of a circle entirely within the boundaries). This concept thus uses a minimum area that is non-fragmented as an indicator of integrity.

In several HCV 2 interpretations for the Congo Basin region, it is recognized that there is no consensus about the interpretation of the HCV 2 definition for the Congo Basin. Rather than providing an explicit interpretation for HCV 2 and a methodology for its identification, the existing HCV guidance documents discuss possible interpretations (Daïnou K., Bracke C., Vermeulen C., Haurez B., De Vleeschouwer J-Y., Fayolle A., 2016; ProForest, 2008; Proforest, 2012; WWF, 2016). The Gabonese interpretation which has been developed prior to the emergence of the IFL concept mentions fragmentation or, reversely expressed, connectivity as an important criteria when evaluating HCV 2. They propose three different interpretations: (1) the totality of Gabon is HCV 2, based on the vision that the Gabonese forests form a quasi-continuum, (2) landscapes that are linked to National Parks and (3) the CARPE Landscapes specifically. Interpretations (2) and (3) are based on the idea to consider priority conservation landscapes as HCV 2 (ProForest, 2008). In other interpretations the debate around IFLs as an indicator of HCV 2 took up an important place (FRM, 2016; Proforest, 2012; WWF, 2016). The HCV interpretation proposed for the Republic of Congo takes up the notion of intactness as central to the HCV concept and argues for an aggregation of different indicators to identify HCV 2; indicator trees for mature forests with little disturbance, high biomass, presence of large mammals and low human presence (FRM, 2016).

Given that indicators reduce the number of measurements and parameters that normally would be required to give an 'exact' presentation of the situation, each indicator in isolation has its weaknesses. By using large predators to identify intact ecosystems or ecosystem integrity, intact ecosystems not housing large predators in their natural state could be neglected. Using IFLs as an indicator for identifying HCV 2, factors other than size and fragmentation that are also crucial determinants of the integrity of an ecosystem, such as connectivity or human disturbance due to hunting, are not evaluated and consequently areas emptied of animals of large size due to unsustainable hunting may be ill-named as intact. This is why the IFL concept has met much resistance. Opponents emphasize that the IFL definition is insufficient for assessing the integrity of an ecosystem (ATBIT, 2016). They emphasize the need for an approach that combines various indicators for assessing the integrity of ecosystems.

Given the weaknesses of each individual indicator used as a proxy for integrity, an approach that integrates different indicators of integrity or non-integrity of an ecosystem seems to be the best solution to assess the cumulative HCV 2 value of an area.

Such assessment of the cumulative HCV 2 value of an area could also inform the optimal placement of the IFL core zones – an HCV 2 management element requested by Motion 65- in logging concession in the area where the cumulative HCV 2 value is highest. FSC's International Generic Indicators (IGIs) specify that indicators for the designation of IFLs core areas should prioritize the most ecologically valuable, contiguous, and intact portions of the IFLs. The integration of different indicators is thus also in direct alignment with the IGIs.

Linked to the landscape character of the HVC 2 value, the integration of this information must either be made at the landscape scale and thus using the data available at this level or at the concession level whereby it has to be assured that the HCV 2 is evaluated in relation to the landscape.

1.1.2. Approaches to define IFL core zone placement

The field of systematic conservation planning focuses on identifying clear objectives for management strategies and using decision support tools to identify where objectives can best be met. It has developed several quantitative spatial planning approaches and tools that can be used to integrate different ecological and socio-economic objectives in order to support zoning land according to its value for conservation and development.

Using systematic conservation planning approaches, the assessment of an area under analysis in terms of its conservation value is determined by the conservation objectives related to each data layer incorporated into the analysis and is usually based on principles such as efficiency, complementarity, comprehensiveness, relevance (in terms of spatial configuration) and representativeness.

Depending on the data layers used in the analysis such planning exercise can also accommodate for multiple-objectives. A common example is to include, apart from environmental and biodiversity information, the economic value of land in the analysis to ensure that conservation is aimed at areas of lower economic value, and therefore areas of least conflict. This has the advantage of minimizing the overall costs of biodiversity conservation, and reducing conflicts of interest related to set asides areas.

The field has developed several tools but two spatial prioritization tools are used commonly. The first is Zonation that produces a hierarchical prioritization of the landscape based on its conservation and development values. The conservation value is determined by the occurrence levels of selected biodiversity features in sites (cells) by iteratively removing the least valuable remaining cell while accounting for connectivity and generalized complementarity. By such means Zonation identifies the top areas important for protected biodiversity, and retaining habitat quality and connectivity based on multiple data layers, indirectly aiming at species' long-term persistence. Development values for alternative land uses can be entered as opportunity cost information in the prioritization process, thus allowing the balancing of alternative land uses.

The second tool is Marxan that also aims to target a range of biodiversity features with avoidance of human interests and financial costs if such are defined by the users. There are two main versions of Marxan. The first version is normally used for reserve planning and similar to Zonation identifies the optimal configuration of areas that achieve conservation targets set for biodiversity, while maintaining connectivity and minimizing socio-economic costs. Targets are the amount of each feature that the program is instructed to select (e.g., 15% of each threatened and rare ecosystem type should be included in the reserve network). Costs are flexible, and can be defined in terms of economic land value, resource harvest value, cultural value of the land, etc. High costs are applied to areas that should be avoided for reserve placement. The second version is “Marxan with Zones” that allows the identification of configuration of several zones simultaneously, each with their own objectives.

While both spatial planning tools help to identify the places most valuable for conservation at the lowest opportunity cost and maintaining connectivity, different outputs are produced depending on the software. Zonation creates a map which ranks each area in terms of its conservation value, Marxan provides two outputs 1) a number of options for areas that achieve objectives, and 2) a priority metric that looks at the likelihood of each individual area needed for achieving the objectives. Both outputs could be used to determine the placement of a set aside area (core zone) for conservation within a FMU, while taking into account the large landscape, and potentially its minimum size.

A regional map grading areas in terms of their HCV 2 value could directly inform the placement of IFL cores within any FMU. Based on a map produced with Zonation or Marxan, IFL core areas would be placed in the area of a FMU that have the highest HCV 2 value, thus the highest value of HCV 2 relative to other areas in the FMU. Such regional map would have to be produced by a modelling expert in consultation with the HCV-RWG. The HCV-RWG would make decisions regarding the data layers that should feed into the analysis and the targets for each layer. The map could directly inform individual concession holders about IFL placement. The advantage of such a map would be that there would be little or no additional work for the concession holders and no arbitrariness in the evaluation of the area in terms of its HCV 2 value. But it has to be questioned whether FSC has the mandate to produce such map and to impose the placement of core zones on its basis. A potential difficult situation could arise if the zoning is not detailed enough to indicate sufficient grading within an individual concession.

Another option is to identify IFL cores on the concession level either using MARXAN or Zonation. In this case individual concession holders would be asked to evaluate their concessions. This would entail an additional work load for concession holders but could allow equity in terms of targets. While locally available data could potentially improve the data basis for the HCV 2 evaluation, such approach would increase the variability and potentially negatively influence the quality of the overall analysis of HCV 2 values within a FMU. ***Important would be to understand in detail how much a concession-level approach can be standardized through a detailed prescription of data handling*** and ***which approach is better if the goal is to ensure the protection of landscape level values, particularly connectivity (second could be explored in a case study).*** One definitive advantage of using Marxan would be that the target size of the set aside area could be defined a priori and the analysis would identify the precise location of the best set aside area taking into account the size of the set aside.

Given the advantages and disadvantages of both options a combination of both approaches may be the best solution. In this scenario the regional map could be used by auditors to judge the concession based assessment of the core zone placement. Zonation could be a good tool for this as it provides a ranking output that could be used at both regional and concessional scales.

The discussion of these propositions and their advantages and disadvantages, but also the discussion of the appropriate data to be used as indicators were questions addressed at the workshop.

1.2. APPROACH EXPLORED TO DEFINE ECOSYSTEMS AND IDENTIFY HCV 3

1.2.1. Introduction

HCV 3 includes ecosystems, habitats or refugia of special importance because of either their rarity, the level of threat that they face, their rare or unique species composition or other characteristics (HCV Resource Network, 2013). All of these parameters increase the risk and the consequences of loss of an ecosystem.

Assessing those parameters requires first of all a typology of ecosystems. An ecosystem can be defined as a set of organisms and their associated physical environment within a geographical area (Tansley, 1935). It is composed of four key elements: a biotic complex, an abiotic environment, the mutual interactions between the different factors and a physical space in which they operate (Pickett & Cadenasso, 1995).

Given the complexity of factors that determine an ecosystem, evaluated units are generally suitable proxies for an ecosystem with equivalent ecological assemblages. Vegetation types are often used as synonyms of operational ecosystem (Nicholson, Keith, & Wilcove, 2009). This is particularly the case in situations where environmental data are sparse (Bland, Keith, Miller, & Murray, 2016). Important is that ecosystems can be clearly delineated on the basis of the typology used (Bland et al., 2016).

To identify the presence of HCV 3 in a FMU, the rarity, the level of threat that to an ecosystem or the species composition of an ecosystem should consequently be evaluate based on the established typology for each of the ecotypes.

The HCV Interpretations of Gabon and DRC provide a non-exhaustive listing of certain HCV 3 ecosystems. In these cases, the ecosystems are vegetation types (ProForest, 2008; Proforest, 2012). However, while they describe criteria, such as a past or future reduction in the extent of an ecosystem, that should be considered to categorize ecosystems as HCV 3, they do neither explain how those criteria relate to the ecosystems listed as HCV 3 nor provide any thresholds (ProForest, 2008; Proforest, 2012; WWF, 2016). The Cameroonian Interpretation that is more explicit about the criteria which should be used to define HCV 3 ecosystems, recognizes the need for such thresholds but does not provide them (ProForest, 2008; Proforest, 2012; WWF, 2016). All three interpretations lack the link to a reference ecosystem typology. A more recent attempt for a national HCV Interpretation for the Republic of Congo recognized the importance of an ecosystem typology by making reference to the vegetation classification by Gond et al. (2013) as a reference to evaluate ecosystem rarity, but lacks further details on the methodological approach that could be used for ecosystem evaluation (FRM, 2016). When looking at current HCV evaluations we can recognize several short comings directly linked to the existing national Interpretations. General shortcomings are the lack of a reference to the total extent of an ecosystem and the lack of an analysis of the risk of loss of those ecosystems including the absence of thresholds for rarity and the reduction in spatial extent.

1.2.2. Approaches to identify HCV 3

A clear typology of ecosystems and a set of criteria and thresholds and related assessment methodologies would present an improvement in the HCV Guidance available for the Congo Basin and help prevent shortcomings related to HCV 3 assessment described above.

IUCN has developed a new framework for the categorization of the threat status of ecosystems in order to create a red list of ecosystems such as is already available for wildlife and used to identify HCV 1 (Bland et al., 2016).

The framework uses the following criteria to categorize an ecosystem:

1. Reduction in distribution
2. Restricted distribution
3. Environmental degradation
4. Disruption of biotic processes
5. Quantitative analysis

The evaluation of criteria 1 and 2 is based on a time series of spatial land cover data. Thereby historical, past, present and future coverage of each ecosystem type can be used as measures to assess the risk of loss. At least two comparable estimates of the distribution of the ecosystem type at different points in time are required. IUCN suggest to compare land cover in 50 years' time intervals.

But not only the time series chosen are important to define the risk of loss and thus the status of an ecosystem, but also the choice of the geographic reference area for the evaluation affects the outcome of the risk of loss analysis. An important criterion related to the risk of loss is rarity. Rarity is defined by the total extent of an ecotype in relation to other ecotypes. For this reason it is tremendously important to define in a sensitive way the geographical area constituting the reference framework for assessing the extent and thus for classifying ecosystems. In other words, the ecosystem classification and categorization should be done in a well-defined geographical area that is generally larger than the FMU. Bio-geographical limits or country limits are usually taken to delimit the frame of reference for such analysis. A biogeographic region is defined by the area in which animal and plant distribution have similar or shared characteristics throughout. Using a country as a spatial reference framework has the advantage of aligning the unit of analysis with the political decision-making unit. Using a biogeographic reference framework for the analysis has the advantage of evaluating an ecosystem over its entire geographic distribution because an ecosystem that is common in one country may be scarce and fragmented (rare and threatened) in another country.

1.2.3. Data available for an ecosystem classification in the Congo Basin

For a typology of ecosystems in the Congo Basin the following data could potentially be used:

A. *CIRAD : Gond, V., Fayolle, A., Pennec, A., Cornu, G., Mayaux, P., Camberlin, P., …. & Gourlet-Fleury, S. (2013). Vegetation structure and greenness in Central Africa from Modis multi-temporal data. Philosophical Transactions of the Royal Society of London B: Biological Sciences, 368(1625), 20120309*

B. UCL: Verhegghen, A., Mayaux, P., De Wasseige, C., & Defourny, P. (2012). Mapping Congo Basin vegetation types from 300 m and 1 km multi-sensor time series for carbon stocks and forest areas estimation. *Biogeosciences*,*9*(12), 5061-5079.

C. WWF: Olson, D.M., E. Dinerstein, E.D. Wikramanayake, N.D. Burgess, G.V.N. Powell, E.C. Underwood, J.A. D'Amico, I. Itoua, H.E. Strand, J.C. Morrison, C.J. Loucks, T.F. Allnutt, T.H. Ricketts, Y. Kura, J.F. Lamoreux, W.W. Wettengel, P. Hedao, and K.R. Kassem. Terrestrial Ecoregions of the World: A New Map of Life on Earth (PDF, 1.1M) BioScience 51:933-938. (Ecoregions approximate the dynamic arena within which ecological processes most strongly interact (Orians 1993))

The following publication provides an example of how ecosystems have been mapped in the DRC based on the UCL vegetation types and the WWF ecoregions:
WWF: Toham,A.K., A.C. Shapiro, M.L.Thieme, A. Blom, R.Caroll, P. de Marcken, R.Lumbuenamo, N. Quist,N. Sindorf, J. Springer, and J.P. Vande weghe, 2009. *République démocratique du Congo: Evaluation stratégique de la biodiversité, suggestions pour de futures aires protégées.* MECNEF, ICCN, WWF,OSFAC. Kinshasa, RDC.

At the workshop the use of the different data to define ecotypes and to assess ecosystem threat status according to the IUCN RLE system were discusse

2. MEETING OBJECTIVES

In reference to the potential approaches for the identification of HCV 2 and 3 described in the introduction, the meeting in Montpellier was held with the objectives described in the table below:

	OBJECTIVES	HCV RELEVANCE
1	Discuss and propose data sets and methodologies to define ecotypes and their extent.	A data layer delimiting different types of ecosystems (ecotypes) is important for HCV 3 identification and HCV 2 evaluation
2	Discuss and propose data sets and methodologies to define the risk of loss of ecotypes and the related threat status (e.g. rare, threatened or endangered ecosystems).	The status of an ecosystem will define which ecosystems are considered HCV 3 and will influence target setting in the HCV 3 evaluation
3	Discuss and propose an approach to integrate data to define IFL core zones (i.e. set aside/ conservation areas)	Important for HCV 2 management
4	Discuss and propose the data layers that should be used to define HCV 2.	Important for HCV 2 identification
5	Discuss and propose the biodiversity targets for each data layers	

3. INVITEES AND PARTICIPANTS

The people listed in the table below are either people contacted to participate in the meeting and/ or people who participated:

Name	**Institution**	**Relevant expertise**	**Participation**
Fritz Kleinschroth	CIRAD	Ecological impacts of logging roads	Thursday
Valery Gond	CIRAD	Vegetation classification in the Congo Basin using remote sensing data	Full participation
Frederic Mortier	CIRAD	Ecological statistics: model to predict (mature) tree communities	Full participation
Sylvie Gourlet-Fleury	CIRAD	Structure, dynamics and functioning of moist tropical forests	Full participation
Barbara Haurez	Nature+	Forest maturity index	Full participation
Hedley Grantham	WCS International	Spatial planning	Full participation
Aurélie Shapiro	WWF Germany	Remote sensing and spatial planning	via skype
Olivia Rickenbach	FSC International	HCVs	Chair
Brian Milakovsky	WWF International	Implementation of Motion 65	unavailable
Nicolas Bayol	FRMi	Technical methods for sustainable forest management	unavailable
Rebecca Miller	IUCN	Red List of Ecosystems (RLE) classification approach	Wednesday afternoon
Fiona Maisels	WCS International	Fauna, Faunal Inventories, Ecology of Central Africa	Wednesday and Thursday via skype

Figure 2. Participants with physical presence on Friday. From left to right: Barbara Haurez, Hedley Grantham, Valery Gond, Sylvie Gourlet-Fleury, Olivia Rickenbach, Frédéric Mortier

4. REPORT

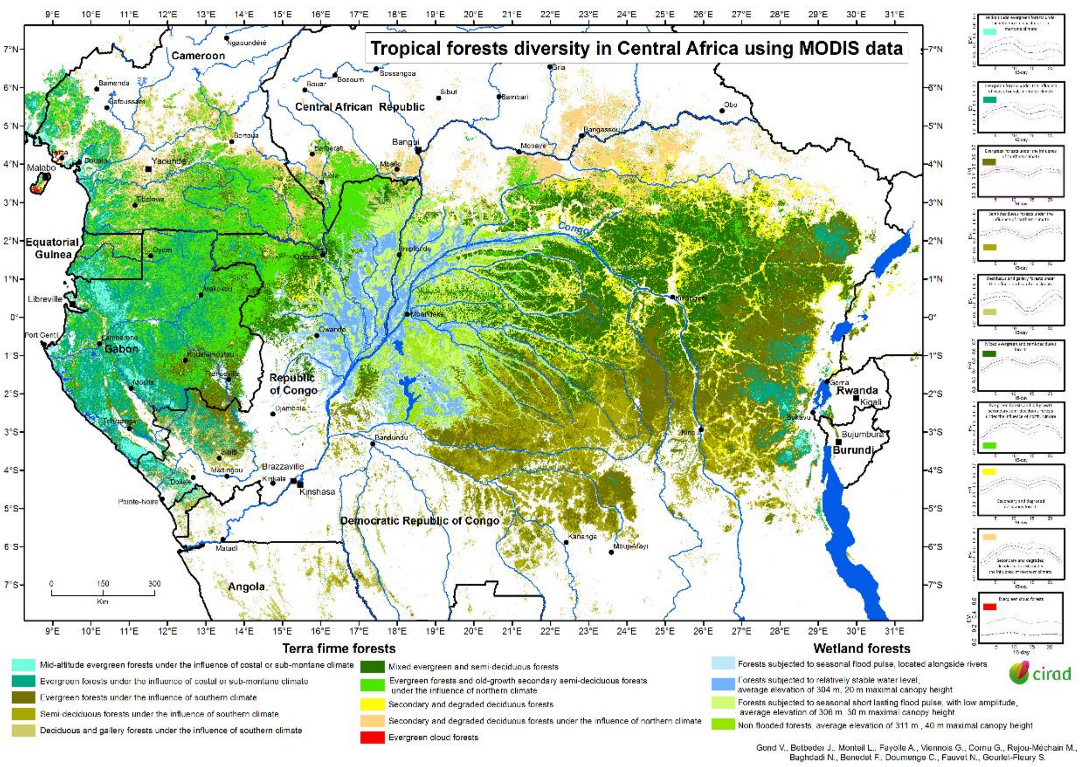
4.1. WEDNESDAY, SEPTEMBER 21

The meeting was started with an introductory presentation given by Olivia Rickenbach, the HCV-Officer, introducing the roadmap project, its objectives, the implementation process, related challenges regarding HCV 2 and 3 and consequent objectives for the key expert meeting.

Wednesday was then dedicated to discussions related to ecosystem classification and ecosystem threat status categorization.

In the morning Valery Gond presented the [vegetation map] (250 m resolution) and typology he had developed for Central Africa (Figure 3).

Figure 3. A map of the vegetation coverage in Central Africa produced by Valery Gond



Valery explained the different methodologies used to map swamp forests and terra firme forests based on remote sensing data. The mapping of both forest types is primarily based on the enhanced vegetation index (EVI), which presents a measure of the photosynthetic productivity of the forest. For the terra firme forests, the vegetation classes were characterized by matching the remote sensing data with basal area (structure) and the degree of deciduousness (function) from inventory plots. Swamp forest classes were characterized based on vegetation height and flooding regimes extracted from LiDAR and Radar data. For more information the following publication can be consulted Valery Gond, Betbeder, Fayolle, & Gourlet-Fleury (2015).

Discussions after Valery's presentation centered on the resolution of the map and accordingly the details captured by it. Aurélie Shapiro would have liked the data to be of a 100 m resolution. But it became clear that such data is currently not available, very difficult to generate and that the existing map is a result of many months of work. Everyone agreed that even if a higher resolution would be ideal, such data does currently not exist and that Valery's data seems to present the best available baseline for an ecosystem classification based on vegetation classes. But because certain details are not captured by the map, and also due to the need to have the accuracy of its representation verified, it was seen as indispensable to have an ecosystem classification based on Valery's data examined by and discussed with field experts, people who know the area particularly well. These discussions should lay the foundation to further refine the map. Missing details should be identified and methods to add such detail to the map. The classification should be documented in detail to allow future improvement when the data basis is improving. Details that are not captured by the map and that came up in the discussions were, for example, forests dominated by specific trees such as the Limbali (*Gilbertiodendron dewevrei*) aggregates, which, according to Sylvie, could be particularly sensitive to disturbance, but also the small forest clearings (baïs) typical for Central African terra firme forests, which bear huge importance for many wildlife species. CIRAD is currently trying to map these two features. In this context, it was discussed whether the clearing itself should be considered as an ecosystem or whether it is the complex of surrounding forests and small clearings, that should be considered an ecotype. Such details need further discussion.

Olivia brought up the question about the availability of information on the species composition of the different vegetation classes. The vegetation classes are currently only characterized by the degree of deciduousness of the tree community. In response to this question Frederic Mortier then presented a model he had developed to predict the distribution of specific tree genera or tree communities. He explained that while the predictions for the Genera were not yet very robust with the current model, such predictions for tree communities were already very robust. This model will be used together with a forest maturity index that will be produced by Frederic and Barbara Haurez to predict zones with mature forest stands.

Next, Aurélie gave a presentation talking about a biodiversity assessment that aimed to identify priority areas for conservation in the Democratic Republic of Congo. Of big interest for the discussions about an ecosystem typology for the Congo Basin was the approach, which was used in this study to define land cover classes. The study had combined the vegetation type cover map made by the Université Catholique de Louvain (UCL) using Spot data (Verhegghen, Mayaux, & Wasseige, 2012) and the WWF terrestrial ecoregions (Olson & Dinerstein, 2001) to create surrogates of ecotypes.

The expert group judged the ecoregions as an appropriate biogeographic units to assess the geographic extent and distribution of the vegetation classes from Gond et al. (2015). The Gond data was preferred over the vegetation type cover map made by the Université Catholique de Louvain because of the more fine scaled classification of the vegetation. It was decide that the Gond data should be overlaid with the WWF terrestrial and freshwater ecosystems to create ecotypes which should be considered as proxies for ecosystems and form the unit of analysis for an ecotype's spatial distribution and extent.

The afternoon was primarily dedicated to understand the IUCN RLE (Red List of Ecosystem) approach to categorize ecosystems based on the risk of loss. Rebecca Miller gave us an introduction to the approach and replied to related questions.

However, at the end of the day there seemed to be quite some confusion about all that had been said. Olivia was asked to present a summary of day one, highlighting the main points of discussion and the conclusions, the next morning.

4.2. Thursday, September 22

The day was started with a short summary of the previous day. The summary and subsequent discussions held on Thursday morning helped to find to the following conclusions that were shared by all participants present that morning:

The way forward to come up with an ecosystem typology and status categorization is, in a first step, to combine Valery's data and the WWF terrestrial and freshwater (if available for all of the Congo Basin??) ecoregions to create ecotypes. This product and additional data layers with biophysical and climatic data should in a next step be discussed in an expert workshop to refine and describe the typology. Based on those discussions a research proposal should be written for a PostDoc to improve the typology (based on additional maps such as the map of Limbali forests, forest clearings and geomorphological analyses for example) and to do an evaluation of Criteria A and B of the IUCN RLE. Aurélie had also suggested the idea to find funding for WWF and WCS to continue with the work. The HCV-officer will write a first concept note for this project idea.

After those conclusions had been reached, Olivia gave an introductory presentation about the HCV 2 and the IFL concept. The presentation explained the HCV 2 and IFL concepts as defined and described by the generic guidelines for HCV identification available from the HCV Resource Network (HCV Resource Network, 2013), the Motion 65 and FSC's International Generic Indicators (FSC, 2016).

After a lunch break, Hedley Grantham presented two approaches that could be used to integrate different data to define IFL core zones using the spatial planning software, Marxan and Zonation. He showed some preliminary analysis to explain to the participants the value of these software tools. While there was general agreement about the usefulness of such software, there were discussions about how connectivity should enter into the analysis. While Aurélie thinks that the IFL core zones should help maintain regional landscape connectivity, Olivia explained that she believes that the core zones should help to maintain the respective IFLs in which they are placed and that it would be more relevant to look at connectivity between the core zones and the individual IFLs of which they form part. This question of connectivity between different IFL blocs or to a particular IFL bloc needs to be discussed further.

After having discussed this overall approach to data integration for HCV 2 mapping and IFL core zone identification, three presentations were held which talked about possible data layers that could be used as HCV 2 indicators.

Aurélie presented a scientific study she had carried out, which demonstrated a direct relationship between forest fragmentation and a decrease in biomass and tree canopy height, whereby the biomass is the more important predictor of fragmentation (Shapiro, 2016). A global data set of biomass for forested areas is available from the University of Wageningen (Avitabile et al., 2016). It would need to be processed to distinguish degradation from deforestation. Such data layer was judged to be an important component to define areas with high HCV 2 value and thus IFL core zones.

Consequently, Fritz Kleinschroth presented how he evaluated roadless space using an empty space function. The value of the use of such approach to define IFL core zones was discussed. But given that IFL core zones should be roadless the use of this function for such purpose seemed less relevant. But Fritz stressed that road planning can make an important contribution to increase the roadless space. The function could be an important approach to monitor the success of road planning measures that aim to increase roadless space.

Barbara then presented her ideas to develop an index of forest maturity based on the composition of tree communities (percentage of early pioneers, long lived pioneers and tree species typically found in old growth forests). Together with Frederic's model such index could be used to create a data layer that ranks areas in terms of their maturity. Barbara hopes to create such data by the latest by February 2017. The resolution for this data was discussed. Frederic thinks that a 5 km grid would be an appropriate resolution given the number of sample plots that underlie the simulation. Aurélie stressed that a 1 km resolution would be much more appropriate for concession level planning. Everyone agreed that generally the core zone identification analysis should be done at least with a 1 km resolution. Barbara and Frederic said that they would see if such resolution could be feasible for their data layer. Olivia stressed the importance to share and discuss the index as soon as possible and before the mapping with many experts and in particular with the HCV-RWG.

The participants also discussed whether wildlife data should be used in the identification of HCV 2 and IFL core zones. However, the only wildlife data available at a regional scale are the density distribution of great apes and elephants. Given that a main predictor of the distribution of these large mammals is the human footprint (Fiona Maisels 2016, pers. comm, 21. September), the group decided that it was best to map the human foot print and to enter it as a constraint into the IFL core zone analysis. It was decided to use regional data sets to develop a human footprint map either based on the methodology described by Venter et al. (2016) or the methodology of Sanderson et al 2002. For precision, Barbara advices to use the second option which uses a range of 0 to 100 to scale the human foot print, instead of the 0 to 50 range scale of Venter et al. 2016.

But because Chimpanzee distribution and abundance has been shown to be correlated with forest canopy height (Fiona Maisels 2016, pers. comm, 22. September), forest canopy height available from Simard et al. (2011) could also be used as an input layer to define HCV 2 priority zones for IFL core zone placement (Simard, Pinto, & Fisher, 2011).

4.3. Friday, September 23

Friday was a half-day meeting. It was started with a summary of the conclusions of the previous days presented by Olivia.

Olivia first summarized the process that was defined to elaborate an ecosystem classification and a threat status categorization of the ecotypes and highlighted open questions, one of which was who could produce a first map of ecotypes based on the Gond vegetation cover and the WWF ecoregions. Sylvie insisted that this question should be clarified. Hedley and Aurélie agreed to start working on this first map together. The seven step process is described under chapter 5. Another question was where to look for funding for the process, in particular for the PostDoc position. Valery proposed the Moore foundation as a possible option. Sylvie also proposed that we contact Philippe Mayaux who could potentially dispose of some European funds.

Olivia then summarize the proposed process to map HCV 2 and to prioritize sites for IFL core zones within IFLs on a regional level. She proposed that, based on Thursday's discussions and presentations, a list should be compile with the data layers that the experts think should enter into the HCV 2 analysis. The list was compiled and it was discussed who could prepare which data layer and for when. Table 2 summarizes the conclusions of the discussions.

Finally, it was discussed if we should target to write a scientific paper as an output of the process. And most people, especially Hedley, Aurélie and Barbara seemed to be very interested in such outcome.

5. Conclusions and the way forward

5.1. Ecosystem Classification and threat status categorization

Experts agreed that such classification and categorization is highly important to define HCV 3, but also as a general tool to promote the conservation of ecosystems and thus biodiversity. Such classification and categorization is particularly important in the context of Central Africa where species data is sparse or sometimes not reliable.

The following seven steps have been defined as the process to achieve such ecosystem classification and categorization:

1. Write a short concept note → *Olivia*
2. Provisional ecotype map based on *Gond's Tropical forest diversity using MODIS* and *WWF Ecoregions* (250 m resolution?) → *Hedley and Aurélie*
3. Hold expert workshop to describe ecotypes and discuss refinement of map and ways of analyzing risks of collapse (spatial reduction) → FSC??
4. Write grant proposal for PostDoc research project → *CIRAD together with FSC*
5. Find/Apply for funding (possible donors: Moore Foundation, Mava Foundation, EU) → *All, joint proposal by CIRAD, WWF, WCS and FSC*
6. PostDoc will refine ecotype map and do risk analysis →*CIRAD*
7. Stakeholder workshop to discuss, refine and approve the product

5.2. Identification of HCV 2 and IFL core zones

There was agreement that IFLs are just one of many indicators of intactness and that the IFL data should therefore be integrated with other HCV 2 indicators to define the IFL core zones.

The use of Zonation spatial prioritization software to integrate different indicators of intactness and to identify the areas with the "Highest value" was considered appropriate. Specific importance should thereby be given to habitat connectivity, although what should be connected and how still needs to be refined. Hedley indicated that he could dispose of some time to train Olivia to run the analysis with Zonation.

The data layers in the table below are the ones that were retained as inputs into the spatial prioritization analysis. The table also indicates the person who will prepare the data for the analysis in Zonation and the date when it should be ready. It needs to be noted that for most data preparation it is unclear who can do this and FSC should look to formalize collaborations and to identify a person who can be committed entirely to the preparation of this data.

Table 2. HCV 2 indicators.

Indicators	indicates	Data preparation for analysis	Data source	Ready by
Vegetation	Ecosystems	Hedley and Aurélie	CIRAD (Gond), WWF (Ecoregions), Global Forest Watch	
IFL	Areas with no roads	???	Global Forest Watch	
Patch size	Size of IFL		Global Forest Watch	
Biomass	Level degradation	Aurélie	University of Wageningen	January
Forest Maturity	Level of forest maturity	Barbara and Frederic	CIRAD	January
Canopy height	Habitat suitable for mammals of high conservation priority such as Chimpanzees, level of degradation	???		
Constraints				
Human footprint	Selects for the areas least impacted by humans	Processing according to Venter et al. 2016 ou Sanderson et al 2002????	Regional data (involve WRI ??)	

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