ZSL
LIVING CONSERVATION

A Practical Handbook for Conserving High Conservation Value (HCV) Species and Habitats Within Oil Palm Landscapes in West and Central Africa

CONTENTS

Tables:

Figures:

Boxes:

Table of Abbreviations and Acronyms

Abbreviation	Full Name
Africa Convention	African Convention on the Conservation of Nature and Natural Resources
ARTS	Adaptive reccee transect sampling
ASL	Above sea level
ASTEVI	Association Terre & Vie
AU	African Union
AEWA	African-Eurasian Waterbird Agreement
CARPE	Central Africa Regional Programme for the Environment
CBD	Convention on Biological Diversity
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMS	Convention on the Conservation of Migratory Species of Wild Animals
CFS	Community Forestry Standards
ECWAS	Economic Community of West African States
EIA	Environmental impact assessment
FPIC	Free, prior, informed consent
FSC	Forest Stewardship Council
GIS	Global information systems
GISP	Global Invasive Species Programme
GPS	Global positioning system
HCV	High conservation value
HCVN	High conservation value network
HCVMA	High conservation value management area
HWC	Human-wildlife conflict
IAIA	International Association for Impact Assessment
IUCN	World Conservation Union (International Union for the Conservation of Nature and Natural Resources)
KPI	Key performance indicator
UN	United Nations
UNFCC	United Nations Framework Convention on Climate Change
IAIA	United Nations Environment Programme
IDR	Republic of Indonesia Rupiah
MOU	Memorandum of understanding
MVP	Minimum viable population
NGO	Non-governmental organisation
NTFP	Non-timber forest products
P & C	Principles and Criteria
PT	Indonesian Limited Company (*Perseroan Terbatas*)
RSPO	Roundtable for Sustainable Palm Oil
SLIMFs	Small and Low Intensity Managed Forests
SOP	Standard operating procedure
USD	United states of America Dollar
WCS	Wildlife Conservation Society
ZSL	Zoological Society of London

The purpose of this handbook

This handbook intends to provide guidance on how to undertake and implement effective measures to maintain and enhance High Conservation Values (HCVs) that persist within oil palm landscapes, a task that has frequently been identified as one of the most challenging aspects of complying with the Roundtable for Sustainable Palm Oil (RSPO) Principles and Criteria (P&C).

Although toolkits (see useful references and resources) have been developed to assist in *identifying* HCVs, at present, there is little country-specific guidance available in the West African region. In particular, there are few toolkits, globally, which assist in implementing *management interventions* to ensure that HCVs are maintained and enhanced. Additionally, the majority of the guidance available has been tailored to the identification and management of HCVs within selectively harvested forests. This is not sufficient to address the different challenges and issues associated with implementing effective measures to maintain and enhance HCVs within oil palm landscapes.

The aim of this handbook, therefore, is to provide practitioners responsible for conserving HCV species and habitats within oil palm concessions, with the necessary knowledge, understanding and practical examples of *how* management interventions can be achieved. The handbook contains accessible summaries of key research, case studies of measures that are currently being implemented by members of the palm oil industry and similar land use types as well as links to available resources. This information will be useful for those involved in management decisions when producing practical HCV management plans as well as aiding HCV assessors.

As such, the primary focus of this handbook is the conservation of species and habitats of high conservation value (HCVs 1-4), and it is therefore not intended to provide comprehensive guidance on the management of all six HCV criteria although they are inextricably linked. For HCV management to be effective, it must be tailored to the local situation, taking into account the social and biological context as values and threats vary between locations. Therefore, this guidance is not designed to be prescriptive, but is instead intended to enable practitioners responsible for conserving HCV species and habitats, to design and implement context-specific management interventions.

The majority of the practical experiences that have contributed to the production of this handbook are drawn from South East Asia where the majority of practices to maintain and enhance HCVs within oil palm landscapes have occurred to date; however, the theory and guidance derived from these experiences have been adapted throughout the handbook to address the context of oil palm expansion in West and Central Africa.

Furthermore, while the case studies presented often illustrate successful conservation initiatives in oil palm plantations in Indonesia and Malaysia, many of the lessons can equally apply in other areas of the world. This is especially true for the African context due to the ecological and environmental similarities of the paleotropical region.

Chapter 1: Introduction

The challenge of conserving species and habitats of HCV is relatively new for many within the palm oil industry and is often viewed as tangential, and at odds with the primary goal of producing palm oil. However, there are strong arguments that conserving biodiversity and ecosystem services contribute to an area's natural capital and therefore should be incorporated within the core operations of every business, particularly for businesses such as the palm oil industry that depend on those natural resources. The most cost effective way for businesses to incorporate conservation concerns is to consider these factors from the outset of establishing an operation, particularly, at the planning stage, when the site of a new plantation has being identified and the plantation ground and clearance plans are being decided.

Protecting your natural capital

Palm oil production is dependent on many natural resources and ecological processes, the majority of which are free, meaning that their true intrinsic value often goes unnoticed by those reliant on them for their businesses to function. This includes, but is not limited to, pest control, pollination, nutrient cycling, climate control and the provision of clean water. These ecological services are the result of a complex web of interactions within, and between, a huge variety of different species (biodiversity) and the air, water, and soil around them. Natural ecosystems and the ecological interactions that underlie their functioning are complex and delicate and thus extremely sensitive to disruption. Small changes to the ecological matrix can result in significant changes to ecological functioning. It is essential therefore to reduce the impact upon ecosystem functioning during palm oil operations.

Compliance with regulations

Working to reduce negative impacts on HCV species and habitats is integral to meeting the national level commitments that many governments have agreed to by signing international conventions, such as the UN Convention on Biological Diversity (UN CBD), the Convention on International Trade in Endangered Species (CITES) and the UN Framework Convention on Climate Change (UNFCC). Palm oil producers that operate within these countries also have a responsibility to comply with a series of national and local laws and regulations designed to protect the environment.

Compliance with the Roundtable on Sustainable Palm oil (RSPO) certification scheme

Mitigating adverse impacts on HCV species and habitats (See Table 1) is a key requirement under the RSPO P&C for those pursing certification. The RSPO P&C demand that HCV areas that may be affected by existing oil palm concessions (Criterion 5.2) or new developments (Criterion 7.3), are identified, maintained and enhanced. The HCV approach is based on six criteria, which encompass biodiversity (HCV 1 to 3), environmental services (HCV 4), and social values (which are considered to be of outstanding or critical importance to communities) (HCV 5 and 6).

Table 1. HCV Criteria

HCV 1. Areas containing globally, regionally or nationally significant concentrations of biodiversity values (e.g. endemism, endangered species, refugia)	
1.1	Protected areas
1.2	Threatened and endangered species
1.3	Endemic species
1.4	Areas of critical seasonal use
HCV 2. Globally, regionally or nationally significant large landscape-level areas where viable populations of most, if not all, naturally occurring species exist in natural patterns of distribution and abundance	
HCV 3. Areas that are in or contain rare, threatened or endangered ecosystems	
HCV 4. Areas that provide basic ecosystem services in critical situations	
4.1	Forests critical to water catchments
4.2	Forests critical to erosion control
4.3	Forests providing barriers to destructive fire
HCV 5	**Areas fundamental to meeting basic needs of local communities**
HCV 6	**Areas critical to local communities' traditional cultural identity**

The HCV criteria are subject to interpretation according to the specific conditions within individual countries. Such National Interpretations have already been drafted in Gabon and Ghana. Cameroon has not yet drafted its National Interpretations; however, a document that intends to give technical support for the national interpretation of HCVs and RSO P&C is available (see useful 'references and resources' at the end of this section for more information).

Useful references and resources

Toward sustainable palm oil and certification

Sophie Persey (ZSL), Ruth Nussbaum (ProForest), Matthew Hatchwell (WCS), Sarah Christie (ZSL), Helen Crowley (WCS). Toward sustainable palm oil: A framework for action. November 2011.

http://www.proforest.net/objects/publications/towards-sustainable-palm-oil-a-framework-for-action

Sustainable palm oil platform

http://www.sustainablepalmoil.org/

Adoption of Principles and Criteria for the Production of Sustainable Palm Oil 2013

http://www.rspo.org/file/revisedPandC2013.pdf

Guidance for developing national interpretations of the HCV toolkit

National Interpretation

http://www.hcvnetwork.org/resources/training-courses-workshops/ProForest%20Mod%2008%20National%20Interpretation%20April%202010.pdf

The first comprehensive practical guidance on identifying and managing High Conservation Value Forests

http://www.proforest.net/publication/bibliog.2010-09-17.4025438883

Good practice guidelines for High Conservation Value assessments: A practical guide for practitioners and auditors

http://www.proforest.net/publication-objects/HCV%20good%20practice_final.pdf

Assessment, Management & Monitoring of High Conservation Values: A practical guide for forest managers

http://www.proforest.net/objects/publications/HCVF%20for%20Forest%20Managers.pdf

National interpretations for different countries

Cameroon:
Toolkit of HCV Process for Small and Low Intensity Managed Forest in Cameroon (SLIMF) - Case of Community Forests
Draft 1 of a toolkit aimed at setting up standards and processes for monitoring and managing HCVs in Cameroon's SLIMFs, June 2008

http://www.hcvnetwork.org/resources/national-hcv-interpretations/Toolkit_HCV_Process_CF_FSC-CMR.pdf

Gabon:
Une Interprétation Nationale des Forêts à Haute Valeur de Conservation pour le Gabon. First draft, April 2008.

http://www.hcvnetwork.org/resources/national-hcv-interpretations/Gabon%20Interpretation%20Nationale%20HVC%20_HCVF%20Gabon_%20v1%2022_04_08.pdf

Ghana:

A National Interpretation of the HCV Forest Toolkit for Ghana, May 2006.

http://www.hcvnetwork.org/resources/national-hcv-interpretations

Ghana National Interpretation Working Group official website

http://www.rspo-in-ghana.org/

Democratic Republic of Congo:
Forêts de Hautes Valeurs pour la Conservation en DRC, Février 2012.

http://www.hcvnetwork.org/resources/global-hcv-toolkits/forets-de-haute-valeur-pour-la-conservation-en-rdc-resultats-de-l2019atelier-d2019interpretation-nationale-des-criteres-hvc-kinshasa-fevrier-2012

Liberia:
High Conservation Values – Draft National Interpretation for Liberia, November 2012.

http://www.hcvnetwork.org/resources/global-hcv-toolkits/draft-national-interpretation-for-liberia

Environmental laws

African convention on the conservation of nature and natural resources, Revised version, African Union, Maputo, 2003.
http://www.au.int/en/sites/default/files/AFRICAN_CONVENTION_CONSERVATION_NATURE_NATURAL_RESOURCES.pdf

List of protected species. African convention on the conservation of nature and natural resources, Revised version, African Union, Maputo, 2003.
http://www.ecolex.org/server2.php/libcat/docs/TRE/Full/En/TRE000492.txt

An introduction to the African convention on the conservation of nature and natural resources, Second Edition, IUCN Environmental Policies and Law, 2006.
http://data.iucn.org/dbtw-wpd/edocs/EPLP-056-rev.pdf

Cameroon:
Portant loi-cadre relative à la gestion de l'environnement (Framework law on environmental management)

http://www.minee.cm/uploads/pdf/Charte/petrole_gaz/96_12%20DU%2005-08-96.pdf

Loi no. 94/01 du 20 Janvier 1994 portant régime des forêts, de la faune et de la pêche (Law on forestry, wildlife, and fisheries)

http://www.droit-afrique.com/images/textes/Cameroun/Cameroun%20-%20Loi%20foret.pdf

Loi no. 98-005 du 14 Avril 1998 portant régime de l'eau (Law for water scheme)

http://www.droit-afrique.com/images/textes/Cameroun/Cameroun%20-%20Loi%20eau.pdf

Loi no. 78-23 relative à la protection des parcs nationaux (Law on the protection of national parks)

http://faolex.fao.org/docs/pdf/cmr39385.pdf

Gabon:
Loi N0016101 Portant code forestier en République Gabonaise (Forest code for the Republic of Gabon)

http://www.riddac.org/document/pdf/gb-codeforestier.pdf

Loi no. 16/93 relative à la protection de l'environnement (Law on the protection of the environment)

http://www.ecolex.org/ecolex/ledge/view/RecordDetails;jsessionid=CE16BC5826EB3B8E0B6637739E6BCB1D?id=LEX-FAOC008719&index=documents

Ghana:
Forest Plantation Development Fund Act, 2000

http://www.epa.gov.gh/ghanalex/acts/Acts/FOREST%20PLANTATION%20DEVELOPMENT%20FUND%20ACT,2000.pdf

Environmental Assessment Regulations, 1999

http://www.epa.gov.gh/ghanalex/acts/Acts/ENVIRONMENTAL%20ASSESSMENT%20REGULATION,1999.pdf
Environmental Assessment (Amendment) Regulations, 2002

http://www.lexadin.nl/wlg/legis/nofr/oeur/arch/gha/l11703.pdf

Environmental Protection Agency Act, 1994

http://www.epa.gov.gh/ghanalex/acts/Acts/ENVIRONMENTAL%20PROTECTION%20AGENCY%20ACT%201994.pdf

Irrigation Development Authority Act, 1977

http://epa.gov.gh/ghanalex/acts/Acts/IRRIGATION%20DEVELOPMENT%20AUTHORITY%20ACT,1977.pdf

Pesticides Control and Management Act, 1996

http://www.lexadin.nl/wlg/legis/nofr/oeur/arch/gha/528.pdf

Wild Animals Preservation Act, 1961

http://www.epa.gov.gh/ghanalex/acts/Acts/WILD%20ANIMALS%20PRESERVATION%20ACT,1961.pdf

Timber Resource Management Act, 1998

http://www.epa.gov.gh/ghanalex/acts/Acts/TIMBER%20RESOURCE%20MANAGEMENT%20ACT,1998.pdf

Timber Resources Management Regulations, 1998

http://www.epa.gov.gh/ghanalex/acts/Acts/TIMBER%20RESOURCE%20MANAGEMENT%20REGULATION%20ACT,1998.pdf

Trees and Timber Act, 1974

http://www.epa.gov.gh/ghanalex/acts/Acts/TREES%20AND%20TIMBER%20ACT,1974.pdf

Liberia:

National Environmental Policy of The Republic of Liberia, November 26, 2002
http://epaonline.org/Liberia_National_Environmental_Policy.pdf

Act adopting the Environment Protection and Management Law of the Republic of Liberia, November 26, 2002
http://epaonline.org/Environment_Protection_and_Management_Law.pdf

New National Forestry Law, 2000 and an Act adopting the National Forestry Reform Law of September 2006 (Amending the National Forestry Law of 2000 and Amending an Act Creating the Forestry Development Authority)

http://www.fao.org/forestry/16151-05fd47b845599b5d3a594a9b0240dacff.pdf

Act for the Conservation of the Forests of the Republic of Liberia (Forests Act, 1953) and a Supplementary Act (1957)
Act adopting a new Wildlife and National Parks and repealing Chapters 1, 2, 3 and subchapters A and C of Chapter 4 Title 24 of the Natural Resources Law, volume 5 of the Liberian Code of Laws 1956, relating to the conservation of forests, forest reserves, conservation of wildlife and fish resources and national parks. (Wildlife and National Parks Act, 1988)
An act for the establishment of a protected forest areas network and amending Chapters 1 and 9 of the new National Forestry Law, Part II, Title 23 of the Liberian Code of Law Revised and thereto adding nine new sections (2003)

For relevant links see: *http://www.fao.org/forestry/lfi/31586/en/*

Democratic Republic of Congo:

Loi n°011/2002 du 29 août 2002 portant Code forestier (Law on the Forestry code)

http://www.leganet.cd/Legislation/Droit%20economique/Code%20Forestier/rdc-loiforets.pdf

Loi n°82-002 du 28 mai 1982 portant réglementation de la chasse (Law on the Hunting regulations)

http://www.leganet.cd/Legislation/Droit%20economique/Chasse/Loi.82.002.28.05.1982.htm

Loi n°75-024 du 22 juillet 1975 relative à la création des secteurs sauvegardés (Law on the Creation of Preserved Areas)

http://www.leganet.cd/Legislation/Droit%20administratif/Environnement/L.75.024.22.07.1975.htm

Ordonnance loi n°69-041 du 22 août 1969 relative à la conservation de la nature (Ruling on the law on Nature Conservation)

http://www.leganet.cd/Legislation/Droit%20administratif/Environnement/OL.69.041.22.08.1969.htm

Décret du 6 mai 1952 sur les concessions et l'administration des eaux, des lacs et des cours d'eaux (Decree on Concessions and Water, Lakes and Streams Management)

http://www.leganet.cd/Legislation/Droit%20administratif/Environnement/D.06.05.1952.htm

Décret du 21 avril 1937 sur la pêche (Decree on Fishing)

http://www.leganet.cd/Legislation/Droit%20economique/PECHE/D.12.04.1937.htm

Décret du 12 juillet 1932 portant réglementation de la concession de pêche (Decree on Fishing permit)

http://www.leganet.cd/Legislation/Droit%20economique/PECHE/D.12.07.1932.htm

Chapter 2: Delineating HCV Management Areas

Once an HCV assessment has been carried out to identify the values and threats present within and around an oil palm concession, the first step is to decide *what* must be done to ensure that these HCVs are maintained and enhanced. The second step is to decide *where* this action must be taken. This is known as the HCV Management Area (HCVMA), as illustrated below.

Box 1. Defining HCV Areas and HCV Management Areas

High Conservation Value Area (HCVA): An area that possesses one or more high conservation values. This may comprise of forest and non-forest areas, e.g. those that provide environmental services, such as a watershed.

High Conservation Value Management Area (HCVMA): The area over which one or more forms of management are undertaken to ensure maintenance or enhancement of one or more HCVs in the area. The HCVMA for a particular HCV may be larger or smaller than the corresponding HCVA

Tools: Aerial imagery and GIS can be used for delineating HCVMAs, they enable the creation of a spatial database comprising various data layers, such as land use, land cover, soil type, ecosystem type, and erosion risk maps to assist with defining HCVMA boundary.

In some cases, the extent of the area which requires management in order to maintain and enhance a particular HCVMA will differ from the area where the HCV is identified to be present (HCV Area) (see Box 1). For example, if an endangered species, such as a chimpanzee, is detected within the oil palm monoculture, this does not mean that the entire plantation becomes an HCV. However, certain areas will need to be retained to maintain the plantations' capacity to support a viable population of the species and/or allow for its movement within the plantation. In other situations, appropriate measures will need to be taken where the HCVMA will stretch beyond the boundaries of the plantation. These situations include cases where wide-ranging HCV species are present, such as forest elephants, or situations where the plantation is adjacent to habitats critical for HCV species or landscapes such as protected areas. In situations such as these, it is

necessary to determine the key areas of natural habitat required to maximise the plantations' ability to support the species population within and designate these areas as an HCVMA.

If oil palm development has already taken place, the identification of HCVMAs will be constrained to areas of natural habitat already set aside due to their unsuitability for oil palm cultivation or in order to comply with national laws and regulations. It is highly unlikely that these areas will be as effective or efficient at supporting HCVs that persist within the landscape as areas specifically designed for this purpose. Therefore, more costly management actions may be needed to maintain and enhance HCVs when HCVMAs are identified retrospectively, rather than at the planning stage. Note that under the RSPO P&C for new oil palm plantings, the identification of HCVs *prior to planting* is compulsory.

The optimal size, shape and location of an HCVMA will depend on the HCV it is aiming to support, the type and severity of ecological and social pressures on the value, as well as the status and distribution of these values within the wider landscape. In many situations an HCVMA will aim to support a number of different HCVs. These values may be overlapping, but in certain situations it may require trade-offs and compromises in order to fulfil all the desired objectives while maximising the function of the HCVMA.

The recommendations below are based on existing scientific research and current best practice but should always be adjusted to take into account the local environment (e.g. soil type, habitat type), regulations, and threats.

Table 2. Management objectives for HCV 1–4
(Adapted from the toolkit for the identification of high conservation values and the toolkit for in Gabon 2008)

HCV	Management objective
HCV 1.1 Protected areas	Maintain the integrity of the conservation area by minimising any direct or indirect impacts from the plantation operations. It is required, in Gabon, to incorporate a buffer zone of at least 5 km around the legally designated protection or conservation area. A participative approach with interested stakeholders (e.g. local NGOs, parks managers) is advised to address issues such as poaching, water pollution.

HCV 1.2 Threatened and endangered species	Ensure the protection of each individual of these species (this will include all individuals of western gorilla and Central chimpanzee populations identified). Consult with adequate specialist for more information.
HCV 1.3 Endemic species	Ensure that sufficient habitat is conserved within the concession and the wider landscape to support a viable population of the species. It is probable that any forest situated over 700m will have endemic species with localised population.
HCV 1.4 Areas of critical temporal use	Ensure that these keystone habitats are accessible and continue to fulfil their function, e.g. as breeding or nesting sites, refugia from fire or flood, or as corridors for movement.
HCV 2 (not included in Gabon toolkit) Globally, regionally or nationally significant large landscape-level areas where viable populations of most, if not all naturally occurring species exist in natural patterns of distribution and abundance	Ensure that a core area of > 20,000 ha as well as a buffer zone of at least 3 km from the forest edge remains as forest or other natural vegetation and that human and ecological disturbance within this area is minimised. Maintain connectivity between different ecosystem types that co-occur within the same landscape.
HCV 3 Areas that are in or contain rare, threatened or endangered ecosystems	Maintain the current condition of the ecosystem and its biological diversity by reducing the direct and/or indirect impact of plantation operations. Some unique and fragile ecosystems will require full protection and a buffer zone of at least 500m should be delineated around them.
HCV 4.1 Forests critical to water catchments	Ideally these areas would be protected from operations. If this is not possible, then management should ensure that the watershed and its hydrological function are maintained. Ensure that a buffer zone of 50 to 100m on the riparian zone along rivers (depending on the river size) remains.
HCV 4.2 Forests critical to erosion control	Wherever possible, the natural vegetation cover should be maintained in these areas. If operations must be carried out, steps should be taken to ensure that this does not lead to increased soil erosion. Limit operations to a minimum in these areas.
HCV 4.3 (not included in Gabon toolkit) Forests providing barriers to destructive fire	These areas should be protected to ensure that they continue to fulfil this function.

Important factors to take into consideration when delineating HCV Management Areas that aim to maintain and enhance biodiversity (HCV 1–3)

Legal requirements

All designated areas for conservation or protection by government regulations e.g. protected areas, ecologically fragile zones and riparian zones alongside rivers should automatically be set aside from oil palm cultivation.

Species' habitat requirements

Species will only survive in the long term if the population is big enough to be viable and self-sustaining. The threshold for a population size to be large enough to viably survive in the long term is known as the Minimum Viable Population (MVP). The MVP required greatly varies between species, depending on their life history (e.g. sex ratio, age at sexual maturity, mating system), and the species' distribution and ecology. In the tropics, very few species have been studied in sufficient detail to accurately determine the MVP. Furthermore, estimating the current population size of a particular species requires detailed biodiversity assessments, particularly for rare and elusive species that are rarely encountered. This is made more difficult as the population size of a species will fluctuate over time.

Further difficulties are presented when distinguishing between sub-populations and larger populations whose habitat extends over a much larger area. so the individuals present within the area being surveyed, may be a subpopulation and therefore part of a larger population, whose habitat extends over a much larger area, that may extends well beyond than the concession being surveyed. It is therefore very difficult to determine over the course of an HCV assessment whether or not the population of a certain species present is a viable one.

An alternative approach is to assess whether or not the size and quality of a habitat (within the wider landscape) is capable of supporting the MVP. Depending on the factors listed below, it is possible to estimate the potential of a habitat/landscape to support a species population. The research based suggested maximum population size that could be supported by a landscape or habitat is known as the landscape's "carrying capacity".

When assessing a landscape's carrying capacity, important factors to take into account include:

- **Access to food and water:** This must be of the correct type and quantity to meet the dietary requirements of a sufficient number of individuals for the population to be viable, particularly for species dependent on vegetation's seasonal food production.

- **Shelter from predators and the environment:** This could include access to suitable roosting or nesting sites, as well as sufficient vegetation cover to hide from predators or prey.

- **Breeding:** The area of habitat required to ensure access to a suitable mate for breeding will vary depending on whether the species is solitary or lives in groups.

As a general rule, the area required to support a viable population of a species is greater for large-bodied species and carnivorous species that require large areas of habitat in order to obtain sufficient prey.

Table 3: Specific habitat requirements of key HCV species in West and Central Africa

HCV species include all species listed in CITES Appendix 1 or 2, all species with IUCN status beyond Least Concern, and all species that are nationally protected by law. Note that the legal status of a species may vary from one country to another. You may contact local wildlife authorities or conservation NGOs for an exhaustive list of nationally protected species.

This table presents just a small sample of potential HCV species in West and Central Africa, more details may be found in Annexe 2 for Critically Endangered, Endangered and Vulnerable mammal, bird, reptile and amphibian species, on the IUCN red list, for the 19 countries producing palm oil in West and Central Africa. All 19 countries are signatory of CMS, and the African Convention, for CITES all countries, except Angola are members

Species	Habitat Preference	Diet	Distribution and Range	Sources
Western Gorilla *Gorilla gorilla* **IUCN Red List: Critically endangered** **CITES: Appendix 1** **African Convention: Class A** **CMS: International migrant species**	Lowland tropical forest, particularly where there is dense herbaceous undergrowth and swamp forests Forest edges and regenerating or dense secondary forests are utilised if poaching is controlled	Herbivorous, diet included pith, leaves and shoots, high consumption of fruit, depending on seasonal availability	Found in Cameroon, Central African Republic, mainland Equatorial Guinea, Gabon, Nigeria, Republic of Congo, Cabinda Province (Angola), and possibly in the Democratic Republic of Congo	Walsh et al. 2008. *Gorilla gorilla*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.2. <www.iucnredlist.org>. Downloaded on 29 June 2013.
Common Chimpanzee *Pan troglodytes* **IUCN Red List: Endangered** **CITES: Appendix I** **African Convention: Class A** **CMS : N/A**	Predominantly in moist and dry forests, and forest galleries extending into savannah woodlands Favours undisturbed primary forest, subject to poaching	Omnivorous, diet varies widely between groups and seasons	From southern Senegal across the forested belt north of the Congo River to western Uganda and western Tanzania, from sea-level to 2,800m above sea level (asl). Highly territorial, group size from 5 to 150 individuals home range varies from 5 to 400 km²	Oates, J.F., Tutin, C.E.G., Humle, T., Wilson, M.L., Baillie, J.E.M., Balmforth, Z., Blom, A., Boesch, C., Cox, D., Davenport, T., Dunn, A., Dupain, J., Duvall, C., Ellis, C.M., Farmer, K.H., Gatti, S., Greengrass, E., Hart, J., Herbinger, I., Hicks, C., Hunt, K.D., Kamenya, S., Maisels, F., Mitani, J.C., Moore, J., Morgan, B.J., Morgan, D.B., Nakamura, M., Nixon, S., Plumptre, A.J.,

				Reynolds, V., Stokes, E.J. & Walsh, P.D. 2008. *Pan troglodytes*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.2. <www.iucnredlist.org>. Downloaded on 29 June 2013.
West African Red Colobus *Procolobus badius* **IUCN Red List: Endangered** **CITES: Appendix II** **African Convention: N/A** **CMS: N/A**	Arboreal species found in a variety of forest types including primary, secondary and riverine or gallery forest Dependent on primary rainforest, subject to poaching	Herbivorous, diet mostly composed of young leaves but also mature leaves, seeds, unripe fruit and shoots	Côte d'Ivoire; Gambia; Ghana; Guinea; Guinea-Bissau; Liberia; Senegal; Sierra Leone Highly territorial group sizes of >20 individuals, rarely goes to the ground	Oates, J.F., Struhsaker, T., McGraw, S., Galat-Luong, A., Galat, G. & Ting, T. 2008. *Procolobus badius*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.2. <www.iucnredlist.org>. Downloaded on 29 June 2013. Vasselin, K. 2011. "*Piliocolobus badius*" (On-line), Animal Diversity Web. Accessed June 29, 2013 at http://animaldiversity.ummz.umich.edu/accounts/Piliocolobus_badius/
Forest Elephant[1] *Loxodonta cyclotis* (sub-species of the African Elephant, *Loxodonta Africana)* **IUCN Red List: Vulnerable** **CITES: Appendix I** **African Convention: Class B**	Lowland tropical rainforests, semi-evergreen and semi-deciduous tropical rainforests, and swamps, change habitats seasonally Favours dense undisturbed rainforest	Herbivorous, diet composed of fruits, leaves, bark, and twigs of rainforest trees	Central and western Africa: in northern Congo, south-western Central African Republic, southeast coast of Gabon, southern Ghana, and in Côte D'Ivoire	Blanc, J. 2008. *Loxodonta africana*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.2. <www.iucnredlist.org>. Downloaded on 29 June 2013. Connor, T. 2009. "*Loxodonta cyclotis*" (On-line), Animal Diversity Web. Accessed June 29, 2013 at

CMS: International migrant species				http://animaldiversity.ummz.umich.edu/accounts/Loxodonta_cyclotis/
Jentink's Duiker *Cephalophus jentinki* **IUCN Red List: Endangered** **CITES: Appendix I** **African Convention: Class A** **CMS : N/A**	In primary forests but known to enter secondary forest and raid crop in some areas in its range Dependent on primary forest	Primarily frugivorous	Côte d'Ivoire; Liberia; Sierra Leone	IUCN SSC Antelope Specialist Group 2008. *Cephalophus jentinki*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.2. <www.iucnredlist.org>. Downloaded on 29 June 2013.
Pygmy Hippopotamus *Choeropsis liberiensis* **Endangered on the IUCN Red List** **CITES: Appendix II** **African Convention: Class A** **CMS : N/A**	Favours heavily forested regions and remains close to streams Secretive and nocturnal species, does not survive in degraded habitat	Herbivorous, diet composed of leaves, roots and fallen fruits	Endemic to four West African countries: Côte d'Ivoire; Guinea; Liberia; Sierra Leone	Lewison, R. & Oliver, W. (IUCN SSC Hippo Specialist Subgroup) 2008. *Choeropsis liberiensis*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.2. <www.iucnredlist.org>. Downloaded on 29 June 2013.
West African Manatee *Trichechus senegalensis* **Vulnerable on the IUCN Red List** **CITES Appendix II** **African Convention: Class A** **CMS: International migrant species**	From large and small rivers, coastal estuaries, freshwater and saltwater lagoons, shallow quiet coastal bays, lakes and reservoirs Requires sheltered water and prefers	Primarily herbivorous but also feeds on small fish and molluscs	Angola, Benin, Cameroon, Chad, Congo, Congo, The Democratic Republic of the, Côte d'Ivoire, Equatorial Guinea, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, Togo	Powell, J. & Kouadio, A. 2008. *Trichechus senegalensis*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.2. <www.iucnredlist.org>. Downloaded on 29 June 2013.

	undisturbed habitat			
Johnston's Genet *Genetta johnstoni* **IUCN Red List: Vulnerable** **CITES N/A** **CMS: N/A** **African Convention: N/A** **CMS : N/A**	Inhabitant of dense rainforest, often observed in wetland, swamp forest and riverine habitat Threatened by forest loss and poaching, further studies needed to determine if the species survives well in degraded land	Carnivorous	Largely restricted to the Upper Guinea rainforest, recorded from Liberia, Guinea, Côte d'Ivoire, and Ghana	Dunham, A. & Gaubert, P. 2008. *Genetta johnstoni*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.2. <www.iucnredlist.org>. Downloaded on 29 June 2013.
Moon Forest Shrew *Sylvisorex lunaris* **IUCN Red List: Vulnerable[2]** **CITES: N/A** **African Convention: N/A** **CMS : N/A**	Limited to primary montane tropical, moist forest Threatened by logging, land conversion and forest fragmentation	Insectivorous	Endemic to the Albertine Rift Mountains of Central Africa Burundi, Congo, The Democratic Republic of the, Rwanda, Uganda	Kerbis Peterhans, J. & Hutterer, R. 2008. *Sylvisorex lunaris*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.2. <www.iucnredlist.org>. Downloaded on 29 June 2013.
Aellen's Roundleaf Bat *Hipposideros marisae* **IUCN Red List: Vulnerable[2]** **CITES: N/A** **African Convention: N/A** **CMS : N/A**	Undisturbed tropical, moist forest, roost sites include natural caves, boulder caves and overhanging cliffs Does not survive well in degraded forest	Insectivorous	From seven localities in Guinea, Liberia and Côte d'Ivoire, may range into Sierra Leone and Ghana although there are no records	Mickleburgh, S., Hutson, A.M., Bergmans, W. & Fahr, J. 2008. *Hipposideros marisae*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.2. <www.iucnredlist.org>. Downloaded on 29 June 2013

African Grey Parrot *Psittacus erithacus* **IUCN Red List: Vulnerable** **CITES: Appendix I** **African Convention: N/A** **CMS : N/A**	Typically inhabiting dense forest, commonly observed at forest edges, clearings, gallery forest, mangroves, wooded savannah, cultivated areas, and even gardens Unclear if affected by habitat degradation	Frugivorous, consumes a variety of fruits and seeds	Angola, Burundi, Cameroon, Central African Republic, Congo, Congo, The Democratic Côte d'Ivoire, Equatorial Guinea, Gabon, Ghana, Kenya, Nigeria, Rwanda, Sao Tomé and Principe, Tanzania, United Republic of, Uganda	BirdLife International 2012. *Psittacus erithacus*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.2. <www.iucnredlist.org>. Downloaded on 29 June 2013.
White-Necked Rockfowl *Picathartes gymnocephalus* **IUCN Red List: Vulnerable** **CITES: Appendix I** **African Convention : Class A** **CMS : N/A**	Lowland primary and secondary forest, forest clearings and gallery forest mainly in rocky, hilly terrain Possible high tolerance of disturbance	Primarily insectivorous, but is known to feed on other types of invertebrates such as molluscs and amphibians particularly during breeding season	Côte d'Ivoire, Ghana, Guinea, Liberia, Sierra Leone	BirdLife International 2012. *Picathartes gymnocephalus*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.2. <www.iucnredlist.org>. Downloaded on 29 June 2013.
African Dwarf Crocodile *Osteolaemus tetraspis* **IUCN Red List: Vulnerable**[2] **CITES Appendix I** **African Convention : N/A** **CMS : N/A**	Lowland equatorial rainforest, vegetated wetlands, primarily deep forest habitat in small forested streams Occurs mostly around terra firma forest, never observed in degraded areas	Carnivorous	Angola, Benin, Burkina Faso, Cameroon, Central African Republic, Congo, Congo, The Democratic Republic of the, Côte d'Ivoire, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Nigeria, Senegal, Sierra Leone, Togo	Crocodile Specialist Group 1996. *Osteolaemus tetraspis*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.2. <www.iucnredlist.org>. Downloaded on 29 June 2013. Riley, J. and Huchzermeyer, F. W. 1999. African Dwarf Crocodiles in the Likouala Swamp Forests of the Congo Basin: Habitat, Density,

				and Nesting. Copeia, No.2: 313-320. Kofron, C. P. 1992. Status and Habitats of the Three African Crocodiles in Liberia. Journal of Tropical Ecology, Vol.8, No.3: 265-273.
Goliath Frog *Conraua goliath* **IUCN Red List: Endangered** **CITES: N/A** **African Convention: N/A** **CMS : N/A**	In or near fast-flowing rivers and streams in the rainforest, can survive in secondary habitats close to rivers, as well as in forest Does not survive in very heavily degraded areas	Herbivorous in tadpoles stage, while adults feed on insects, crustaceans, fish, molluscs, small mammals and amphibians	From south-western Cameroon in the region of Nkongsamba, and south to Monte Alen in mainland Equatorial Guinea	Jean-Louis Amiet 2004. *Conraua goliath*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.2. <www.iucnredlist.org>. Downloaded on 29 June 2013. Khandelwal, S. 2008. "Conraua goliath" (On-line), Animal Diversity Web. Accessed June 29, 2013 at http://animaldiversity.ummz.umich.edu/accounts/Conraua_goliath/

[1]Extensive research needed to support the proposed re-classification into a separate species needed
[2]Further studies needed

Landscape connectivity

Single HCVMAs within oil palm concessions will often not be of sufficient size or quality to meet the habitat requirements of many species. Therefore, maintaining and enhancing landscape connectivity is vital to ensuring the habitat requirements for species can be met; including, having sufficient access to food, water, mates, with the ability to disperse, migrate or expand their range, when necessary. Such measures are also important in reducing the competition for resources between humans and wildlife in turn mitigating Human-Wildlife Conflict (HWC). Improved landscape connectivity also helps augment a number of different ecological processes, including pollination and seed dispersal, which are vital to maintain plant communities.

In important component of ensuring landscape connectivity is conserving wildlife corridors or patches of forest that form '*stepping stones*' of a suitable habitat through the monoculture of oil palm plantations. Wildlife corridors and stepping stones enable the movement of wildlife across landscapes dominated by oil palm. In some cases, natural corridors can be utilised, for example, riparian zones (areas which run alongside rivers) may already function as wildlife corridors often protected under national laws they can improve connectivity between larger areas of suitable habitat within the wider landscape. The size of forest fragments and their proximity to one another are essential considerations when designing wildlife corridors (See table 4). Species such as chimpanzees have the ability to move between fragments of forest as long as these fragments are in close proximity to each other.

How effective corridors and stepping stones are how they support the improvement of landscape connectivity will depend on the following factors:

- **Target species: meeting the habitat requirements of particular species**. Often worth identifying the requirements of several 'umbrella species' - species with habitat requirements that encompass the habitat requirements of many other species. By designing wildlife corridors that fulfil the habitat requirements of umbrella species, the requirements of many other species are also met automatically. For example when designing a wildlife corridor that would allow for an arboreal species such as Chimpanzee to move through the forest, the continuity of forest canopy needed will also provide connectivity to other species and cover to ground dwelling species. Therefore, corridors should be designed to meet the requirements of several 'umbrella' species; meaning, ensuring corridors can support a wider range of other species and ecological processes e.g. the West African Grey Colobus.

- **Width of corridor:** The boundaries of forested areas will be subject to increased levels of disturbance or 'edge effects' (see below) these will reduce the quality of the habitat within the boundaries of the corridor. This degradation will reduce the likelihood off corridors being used by wildlife, particularly those species most adversely affected by habitat fragmentation. Research in the Amazon has suggested that it is necessary for corridors to be at least 400m wide to provide suitable habitat for the majority of forest-dependent disturbance sensitive vertebrate species. For forest-dependent species with larger habitat requirements, such as lowland gorillas, chimpanzees, and forest elephants, the width of corridor required may be up to 800m.

- **Size of gap between forested areas or 'stepping stones':** A target species' home range is an essential factor when considering gap size. Typically species with small body sizes or those that are highly adapted to a specific habitat type are less tolerant of large gaps, therefore requiring much more forested areas to move within disturbed habitats than large-bodied more generalist species. Therefore for many species, there exists a threshold beyond which the distance between stepping stones becomes to great preventing a species from moving between patches. So the loss of a small stepping stone patch, can therefore significantly reduce the functional connectivity of the landscape.

Table 4. Potential effectiveness of linear corridors vs. stepping stones for increasing landscape connectivity

*** Effective approach * Somewhat effective

– Unlikely to be an effective approach (Bennett 2003)

	Stepping stone	Habitat corridor
Less disturbed landscapes		
Species tolerant of habitat disturbance[1]	***	–
Species intolerant of habitat disturbance[2]	*	***
Wide ranging and mobile species[3]	***	*
Community and ecological processes[4]	*	***
Greatly disturbed landscape		
Species tolerant of habitat disturbance[1]	***	*
Species intolerant of habitat disturbance[2]	*	***
Wide ranging and mobile species[3]	***	*
Community and ecological processes[4]	–	***

[1] picathartes (*picathartes spp.*), bongo (*tragelaphus eurycerus*) and duiker species (*cephalophus spp*.),

[2] pygmy hippopotamus (*choeropsis liberiensis*), okapi (okapia johnstoni), black colobus (*procolobus badius*)

[3] baboon (*papio spp*.), leopard (*panthera pardus*), [4] such as seed dispersal, predator-prey relationship, nutrient cycling

Human and ecological edge effects

The proximity of natural habitat to a disturbance, such as, human settlements or access routes (including roads and rivers) will determine the risk level of encroachment, hunting, logging and mining within the area. This must be taken into consideration when delineating HCVMAs, as dependent on the HCVs present it may be necessary to leave buffers of either natural habitat or oil palm around the HCVMAs in order to limit their exposure to human disturbance.

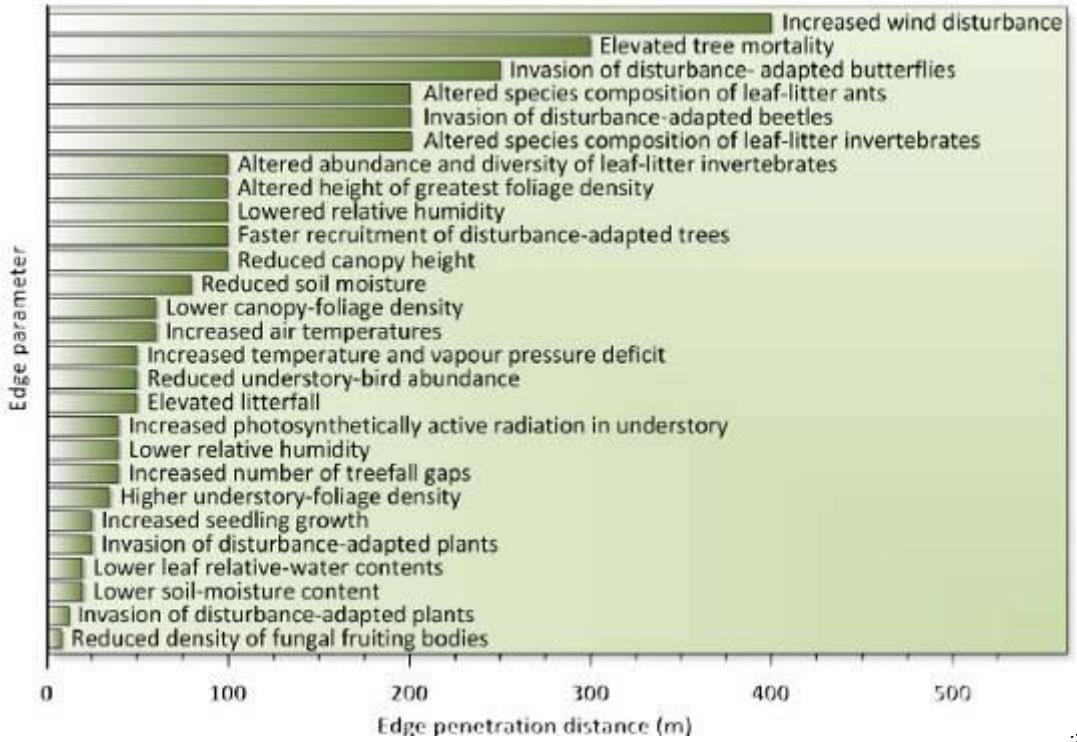
Similarly, forests adjacent to areas have been cleared or planted with oil palm have become more exposed to environmental factors that can reduce the quality of the habitat and its ability to support biodiversity. These factors includes increased exposure to sunlight and wind, resulting in the edge of the forest becoming hotter, lighter, and drier than in a natural forest This exposure, if not managed, can cause the corridor to continue to degrade and be reduced in size, while greatly increasing the potential for wild fires. Further damages can also be caused by increased exposure to invasive species which have been introduced as part of the cultivation process and may spread from the planted areas to HCV areas such as Mucuna spp. As with any monoculture there is also a drastic

increase in the likelihood of exposure to increase levels of pest species such as the termite species *Coptotermes curvignathus*.

The shape of the HCVMA, is therefore critically important, as it determines the proportion of the habitat that is exposed to both human and ecological edge effects. Circular or square patches of habitat have a smaller perimeter to area ratio than long narrow patches of habitat, reducing areas of exposed forest causing harmful edge ensuring a core area of good quality undisturbed habitat. Consequently, circular or square patches of habitat are likely to be more effective at conserving biodiversity than long narrow patches

It may be necessary to leave buffer zones of natural or planned vegetation beyond the boundary of the area considered to be of High Conservation Value, in order to reduce the impact of harmful edge effects. These 'softer' edges reduce the effects of environmental factors and invasive species. Research in the Amazon (see Figure 1) suggests that buffer zones of natural vegetation at least 100 m wide would be necessary to prevent the most extreme edge effects from having a negative impact on HCV habitats, although this would ideally be 400 m to avoid these completely.

Figure 1. Results from a 22-year investigation into the decay of forest fragments reveal penetration distances of different edge effects in the Biological Dynamics of Forest Fragments Project in the Brazilian Amazon
(*From Managing Biodiversity in the Landscape. Guidelines for Planners, Decision Makers and Practitioners. Government of Malaysia. 2009)*



Preventing water pollution from runoff containing soil sediments, pesticides, fertilisers or other chemicals

Buffer zones of natural vegetation have been shown to reduce the effects of edge effects as well as helping reduce soil erosion and water pollution. The natural vegetation helps slow surface runoff, meaning, there is more time for the soil and vegetation to trap soil sediments, excess nutrients, and chemicals carried directly in the water. However, they are not sufficient in removing all pollutants, so should be considered as a final defence rather than an alternative for measures that prevent soil erosion and water pollution.

Research in the Amazon suggests that buffer zones of natural vegetation of at least 100m is necessary to prevent the most extreme edge effects from negative impact on HCV habitats, ideally buffer zones of 400m would prevent issues completely. These 'softer' edges reduce the effects of environmental factors and invasive species.

The ability of buffer zones to filter and absorb soil sediments and pollutants will depend on:

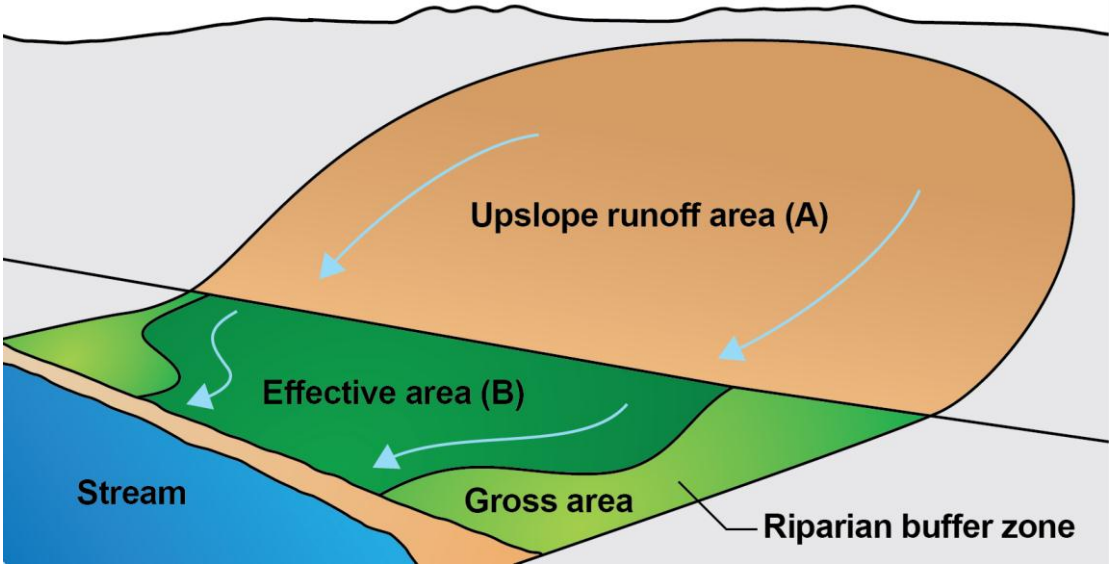
- **Position:** Priority areas for buffer zones include watercourses and areas where ground water and surface runoff collects, in particular, those close to sources of pollution, such as oil palm seedling nurseries where large volumes of fertilisers and pesticides are used. Low-order streams (where two or more streams combine) are also important to buffer, as this is where runoff from upland areas first enters the river system. Wherever possible, buffer zones should follow the contours of a slope, to try and reduce the speed of water flow across the buffer, which will make it more effective at removing pollutants.

- **Width:** The width of the buffer zone required to remove nutrients and pesticides from surface runoff can vary from 5m to 110m, depending on a number of factors:
    - **Topography:** Wider buffer zones will be required in steeper areas (defined as slope > 10%–40%) to slow surface runoff and allow sufficient time for sediments and pollutants to be removed. As very steep areas do not provide many of the functions of riparian zones on flatter slopes, it often recommended that they should be excluded when calculating the effective width of a riparian buffer zone (See figure 2).
    - **Soil type:** The soil type will affect the ability of the soil to absorb water and pollutants. More permeable soils (e.g. chalk), absorbs water more

easily, so will help to reduce the volume of surface runoff but are less efficient filters for removing pollutants. Less permeable soils (e.g. clay), will be more effective at removing nitrogen from the water, as they provide the anaerobic conditions necessary for denitrifying bacteria. Wider buffer zones will be needed where the soil is less permeable (finer textured) to allow time for surface runoff to be absorbed and pollutants to be trapped.

- **Vegetation:** Structurally diverse vegetation (both horizontally and vertically) comprising of trees, shrubs and grasses native to the area which are suited to the local environment, will be most effective in absorbing various pollutants, trapping sediments and stabilising the soil.

Figure 2. Effective width of buffer zones
(From Bentrup, G. (2008))



The amount of runoff through an area of buffer should be low to achieve high pollutant removal. One consideration is to base the design on a ratio of upslope runoff area (A) to effective buffer area (B). Lower ratios (e.g. 20:1) can provide substantially greater pollutant removal than higher ratios (e.g. 50:1) in many cases. Note that the effective buffer area is the actual pathway that runoff travels to the stream and it may be smaller than the overall gross area of the buffer.

Preventing soil erosion, river sedimentation, and downstream flooding

The risk of soil erosion is high as well as the likelihood of downstream floods in steep areas, where the soil has low surface permeability, or where the natural vegetation within the watershed has been cleared or degraded, the speed and volume of surface runoff is

greatly increased. Retaining natural vegetation within river catchments and riparian buffer zones will both help to reduce the speed of surface runoff and stabilise the soil, thus reducing the potential for soil erosion.

Research in temperate regions has suggested that the minimum width of riparian zone required to prevent soil erosion is between 10m and 30m on either side of the river. Buffer zones of up to 150m on either side are recommended to reduce downstream floods. However, this may be different in tropical ecosystems and the size of the buffer zone will need to be adjusted based on:

- **Slope:** Wider buffer zones will be required in steep areas (defined as slope > 10%–40%) to slow surface runoff and reduce the risk of flood events. It has been suggested that very steep areas of land contribute little to reducing soil erosion and should be excluded when calculating the effective width of a riparian buffer zone. Ideally very steep land should not be cleared and any natural vegetation be left in place.

- **Soil type:** Wider buffer zones will be required in areas where the soil is less permeable. Finer-textured soils are typically less permeable than sandy soils.

- **Vegetation:** If the vegetation in the riparian zone is degraded or has yet to mature (e.g. when buffer zones have been restored), then the width of the riparian buffer should be increased to allow for erosion of the river bank, which will be expected to occur before the vegetation is capable of stabilising the soil. This can be estimated based on the approximate rate of erosion and the period of time it will take for the vegetation to mature. If significant areas of natural habitat have been cleared within the watershed, the width of the riparian zone will need to be increased in order to counteract the increased volume and speed of surface runoff. Although National Interpretation may stipulate the appropriate width of riparian buffer zone, it is important to also verify national legislation as it may specify otherwise. The table below should be used as recommendations and refers to the national legislation in Indonesia.

Table 5: Recommended widths of riparian buffer zones from an HCV assessment in an oil palm concession in West Kalimantan, Indonesia
(From Daemeter Consulting (2009)

River width (metres)	Width of buffer on each side (metres)
>30 m	100 m
20–30 m	50 m
8–20 m	20 m
5–8 m	10 m
<5 m	5 m

Important factors to take into consideration when delineating HCVMAs and Riparian Zones that aim to prevent water pollution, soil erosion and downstream flooding

Legal requirements

Regulations may already exist, which require buffer zones to be maintained, such as around water bodies or steep slopes. These areas may be required to be left unplanted and should be considered as the minimum requirement when delineating riparian buffer zones and areas of natural habitat which aim to maintain and enhance HCV 4. However, this minimum requirement may not be sufficient to ensure the areas of natural habitat set aside, are sufficient to prevent water pollution, soil erosion and downstream flooding, so more habitat may need to be set aside.

Useful references and resources
Guidance for conducting HCV assessments
Good practice guidelines for High Conservation Value assessments: A practical guide for practitioners and auditors *http://www.hcvnetwork.org/resources/folder.2006-09-29.6584228415/HCV%20good%20practice%20-%20guidance%20for%20practitioners.pdf*
Summary Report for HCV Assessment for Olam Oil Palm Plantation Development in Gabon *http://www.rspo.org/_v2/file/Summary%20Report%20for%20Olam%20Palm%20HCV%20assessments_Final%2016%2001%2011%20p%201.pdf*
Guidance on designing conservation areas for biodiversity, wildlife corridors & riparian zones
Bennett, A.F. 2003. *Linkages in the Landscape: The Role of Corridors and Connectivity in Wildlife Conservation.* IUCN Forest Conservation Programme. Conserving Forest Ecosystems Series No. 1. *http://app.iucn.org/dbtw-wpd/edocs/FR-021.pdf*

Bentrup, G. 2008. *Conservation Buffers: Design Guidelines for Buffers, Corridors, and Greenways.* Gen. Tech. Rep. SRS-109. Asheville, NC: Department of Agriculture, Forest Service, Southern Research Station.

http://www.unl.edu/nac/bufferguidelines/docs/conservation_buffers.pdf

Biodiversity Support Program. 1993. *African Biodiversity: Foundation for the Future: A Framework for Integrating Biodiversity Conservation and Sustainable Development*

http://www.worldwildlife.org/bsp/publications/africa/issues_3/afbiodiv.pdf

Crooks, K. R. & Sanjayan, M. 2006. *Connectivity conservation: maintaining connections for nature*. In K. R. Crooks & M. Sanjayan (Eds.), *Connectivity Conservation* (Conservation Biology 14 ed., pp. 1-19). New York: Cambridge University Press.

Fischer, R.A. & Fischenich, J.C. 2000. *Design Recommendations for Riparian Corridors and Vegetated Buffer Strips*

http://el.erdc.usace.army.mil/elpubs/pdf/sr24.pdf

Morgan, D., Sanz, C., Greer, D., Rayden, T., Maisels, F. & Williamson, E.A. (2013). *Great Apes and FSC: Implementing 'Ape*

Friendly' Practices in Central Africa's Logging Concessions. Gland, Switzerland: IUCN/SSC Primate Specialist Group. 36 pp

http://www.arcusfoundation.org/images/uploads/downloads/Great_apes_and_FSC.pdf

Species-specific ecology and conservation

Blanc, J.J., Barnes, R.F.W., Craig, G.C., Dublin, H.T., Thouless, C.R., Douglas-Hamilton, I. & Hart, J.A. 2007. *African Elephant Status Report 2007: An update from the African Elephant Database*. SSC Occasional Paper Series 33. IUCN, Gland, Switzerland.

Ferriss, S. Western Gorilla (*Gorilla gorilla*). In: J. Caldecott & L. Miles (Eds.), *World Atlas of Great Apes and Their Conservation*. London: University of California Press.

http://books.google.co.id/books?id=VMtbmkOYD-kC&pg=PA105&dq=Gorilla+ecology&hl=en&sa=X&ei=b9fjT-zOAoPTrQe-uMmJCQ&redir_esc=y#v=onepage&q=Gorilla%20ecology&f=false

Harcourt, A.H. & Stewart, K.J. 2007. *Gorilla society: conflict, compromise, and cooperation between the sexes*. Chicago: The University of Chicago Press.

http://books.google.co.id/books?id=sBu9rUprPywC&pg=PA91&dq=Gorilla+ecology&hl=en&sa=X&ei=ONbjT9SsLMSmrAf-u5jqCA&redir_esc=y#v=onepage&q=Gorilla%20ecology&f=false

IUCN Central African Elephant Conservation Strategy (2005). Accessed 30/10/10.

http://www.african-elephant.org/tools/pdfs/str_afc0512_en.pdf

Kormos, R., Boesch, C., Bakarr, M.I. & Butynski, T.M. (Eds.). 2003. *West African Chimpanzees: Status Survey and Conservation Action Plan.* IUCN/SSC Primate Specialist Group.

http://books.google.co.id/books?id=aerjXoZglAQC&printsec=frontcover&hl=id&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false

Sinclair, A. R., Fryxell, J. M., & Caughley, G. 2006. *Wildlife ecology, conservation, and management* (Second ed.). Oxford: Blackwell Publishing.

Sukumar, R. 2003. *The living elephants: evolutionary ecology, behavior, and conservation.* Oxford: Oxford University Press.

Tutin, C., Stokes, E., Boesch, C., Morgan, D., Sanz, C., et al. (2005). *Regional Action Plan for the Conservation of Chimpanzees and Gorillas in Western Equatorial Africa.* Washington DC.

Chapter 3: Developing an HCV management plan

Process

To ensure that an HCV management plan is practical and well suited to the oil palm concession where it will be implemented, it is important that the following stakeholders are involved in the process of development.

- **HCV assessment team**
- **Plantation managers and staff who will be responsible for implementing the management plan**
- **Adjacent land users**
- **Local government**
- **Local communities**
- **NGOs and researchers working in the area**

It is recommended that the following steps are taken to develop an HCV management plan:

Step 1: Gap analysis

Carry out a gap analysis of the current plantation management practices, identifying areas where these conflict with the goal of maintaining and enhancing HCVs, as well as highlighting areas where additional management interventions will be required to achieve this.

This should be carried out jointly by the **HCV assessment team** and **the plantation management and the staff that will be involved in implementing the HCV management plan**

Step 2: Draft HCV management plan

This should include: Objectives, Indicators, the baseline values of each indicator used, time-bound targets for each indicator, management activities, monitoring and evaluation of each activity, the person in charge for tasks/activities and the budget required (see table 6). It is worth considering using the SMARTER guidelines (Specific, Measurable, Achievable, Relevant, Time bound, Evaluate and Review).

This should be led by the **HCV assessment team** but will require input from the **plantation management and staff that will be involved in implementing the HCV management plan.**

Step 3: Public consultation

The management activities proposed in the draft HCV management plan should be explained to all stakeholder groups that will be involved in or affected by its implementation during a public consultation, this could be done by holding a workshop or arranging meetings with representatives from key stakeholder groups. It is important that the reason for implementing these management activities and their relevance to the stakeholder groups participating are clearly explained. Protocols for receiving feedback and recommendations from these stakeholder groups should also be in place.

Important stakeholder groups to involve include **company employees**, **adjacent land users**, **local communities** and **NGOs or researchers working in the area surrounding the plantation.**

Step 4: Revise and finalise HCV management plan

This should be led by the HCV assessment team, but the final version must be signed off by the plantation management. If the quality or suitability of the HCV management plan is in doubt, the company may wish to have the management plan peer reviewed. This could be done by members of the HCV Resource Network Technical Panel or Regional Networks.

This should be led by the **HCV assessment team** but with close involvement and final approval from the **plantation management and the staff that will be responsible for implementing the HCV management plan.**

Table 6: Example of the structure of an HCV management plan for an oil palm concession
(Adapted from an HCV management plan developed by Wilmar International and Aksenta Socio-Environmental Consulting for an oil palm plantation in Indonesia)

Objective	Indicator	Baseline	Target	Time	Management activity	Monitoring activity	Person in charge	Budget (USD)
To improve the habitat quality in the key areas used by wildlife	% of natural vegetation cover	Need to collect data on the % of natural vegetation cover in areas that provide key habitats for wildlife	100% natural vegetation cover in areas that provide key habitat for wildlife	2020	• Measure the % of natural vegetation cover in areas that provide key habitats for wildlife • Clearly mark the boundary of the HCVAs and put up sign boards • Raise awareness amongst plantation workers and local communities about the importance of protecting these areas • Carry out regular patrols to deter and detect encroachment, illegal mining and illegal logging.	Measure the % natural vegetation cover annually	The division manager for each area	2,000

Useful references and resources
Publicly available examples of HCV management plans for oil palm concessions
Malaysian Environment Consultants. 2011. Public Summary of HCV Management Plan for PT Kutai Mitra Sejahtera, East Kalimantan. *http://www.hcvnetwork.org/resources/assessments/PT%20KMS%20Management%20Plan%202011-2013.pdf*
Proforest. 2011. Public Summary of HCV Management Plan for an OLAM oil palm concession in Gabon *http://www.hcvnetwork.org/resources/assessments/Summary%20Report%20of%20Planning%20and%20Management%20Olam%20NPP.pdf*

Chapter 4: Implementing an HCV management plan

Successful implementation an HCV management plan requires the following considerations:

Budget

The resources needed to establish an HCV team and implement the activities outlined in the HCV management plan, should be discussed and agreed upon with plantation management during the development of the management plan. Funds should be allocated from the plantation's operational budget as soon as the HCV management plan is finalised, if not before.

Human resources

The company should recruit a member of staff, or team of staff, who will be responsible for implementing the HCV monitoring and management activities. To do this effectively, they should be based on or nearby the plantation with sufficient time to implement the activities outlined in the HCV management plan. To reduce the financial burden on a single company and to facilitate a landscape level management approach it may be beneficial for neighbouring palm oil companies to pool their resources and establish a joint HCV management team. This would reduce costs and help to promote a landscape-level approach to HCV management, which is likely to be more effective.

The team responsible for HCV monitoring and management should have the following skills and abilities between them:

- Ability to engage with local communities;

- At least a sound understanding of biodiversity conservation/forestry and why HCVs need to be protected and monitored;
- Authority to enforce company policies and ideally, knowledge of local, regional, and national regulations;
- Training on RSPO, HCV management, and monitoring and how to put the HCV plans into action.

Existing plantation security guards may be able to assist in HCV monitoring and management by patrolling the areas. However, the security team are unlikely to have the skills necessary to maintain and enhance HCVs within the concession effectively. Therefore, it may be beneficial to collaborate with members of the local communities, NGOs or government departments in order to carry out HCV monitoring and management (see Chapter 7: Engaging stakeholders).

Standard operating procedures

The management and monitoring activities outlined in the HCV management plan, once agreed, should be translated into Standard Operating Procedures (SOPs). These ensure that the agreements become part of routine plantation management and that mechanisms are in place to make sure these activities are implemented. Knowledge of these SOPs by company employees are vital (See Chapter 7: Engaging stakeholders).

Support from plantation management and staff

Having plantation managers and staff supportive of the work by the HCV management team is essential. Therefore, a company policy in place outlining its commitment to maintenance and enhancement of HCVs is needed. In achieving this, all company staff would understand *why* these areas are being conserved and *what* needs to be done to conserve them (see Chapter 7: Engaging stakeholders).

Equally, senior and estate management must be fully aware and understand the requirements of HCV management and monitoring to approve the necessary budgets and management plans.

HCV management must be integrated into everyday practice. Ideally, the effectiveness to maintain and enhance HCVs should be linked to the Key Performance Indicators (KPIs),

or bonus structures for all plantation managers and staff. This will help to promote a collective corporate social responsibility for conserving HCVs within the concession.

Examples of simple KPIs that could be incorporated include the annual change in size of intact HCVMAs or the difference between the quality of water when it enters and exits the plantation boundaries.

Case-study: ZSL Wildlife Wood Project and applying the High Conservation Value concept in Cameroon

What? Partnership between the Zoological Society of London and the timber companies, Pallisco and SFID, for flagship species conservation as part of company commitment under FSC certification to implement High Conservation Value (HCV) principles within two concessions over almost 125,000ha.
Where? Pallisco and SFID timber production forests in Cameroon

Aims:

1. Assisting companies in identifying and mapping great apes' High Conservation Value (HCV) areas within the concession and adapting management accordingly. Identifying High Conservation Values (HCV) is a key concept in timber certification processes (e.g. Rainforest Alliance certification), and an integral part of the Forest Stewardship Council (FSC)'s standard (see FSC's Principle 9).

2. Providing the companies' staff with training on monitoring techniques to enable them to effectively monitor the HCV areas.
3. To ensure the maintenance of the HCV values. Chimpanzees, in particular, have been shown to be negatively impacted by logging activities and their consequent displacement may drive them into the territory of neighbouring groups. Being a highly

territorial species, this may result in injury or killing of individuals or in extreme cases the wiping out of whole groups. Minimising this displacement is crucial for this species.

How?

Carry out field surveys to identify and map potential HCV areas for great apes using the Adaptive Recce Transect Sampling (ARTS) as a survey technique (using great apes nest as an indirect sign of species presence).

Integrate the ARTS techniques within the timber companies' broader wildlife monitoring and operational management and provide the necessary training to the wildlife monitoring teams (9 staff were trained in data collection during ARTS survey and 1 staff in each company has received specific data analysis training).

Pallisco's survey: a total of 84km of recce transects and 17km of linear supplementary transects within the active block of the concession were surveyed.

SFID's survey: a total of 132km of recce transects and 52km of linear supplementary transects were surveyed in the active 5-yrs logging block due to be exploited from 2012

Resources needed:

GPS, a computer and data analysing programmes (CyberTracker©, ArcGIS)

Progress to date:

SFID's survey:

- Confirmed the presence of six out of twelve focal species (a suite of protected species and those particularly sensitive to the impacts of logging/hunting)
- Produced a distribution map for each of these in the active logging blocks
- Two core areas with a high concentration of nest sites were identified using the ARTS technique, suggesting the presence of at least two chimpanzee groups
- Produced a detailed report of recommendations to SFID identifying these areas as representing HCV and suggestions for adapting their proposed harvesting regime to avoid adversely impacting upon them.

Pallisco's survey:

- Confirmed the presence of eight large mammal species
- Produced a distribution map for each species to inform forest managers about the presence of wildlife in this portion of the forest
- Identified two important nesting areas for chimpanzees that we attributed to core areas of two groups composed of at least four and five individuals, respectively
- Produced a report of our recommendations to our partner to take specific management measures in and around those areas with the objective to avoid the displacement of chimpanzee groups

Both Pallisco and SFID have now incorporated the collection of geo-referenced information on the location of chimp nesting sites, into the data collection requirements of their timber prospection surveys. This complementary information allows the planning of harvesting operations in order to minimise the impacts on chimpanzees. SFID has also initiated additional ARTS surveys as part of broader-scale bio-monitoring programmes in neighbouring concessions.

References

Wildlife Wood Project, Zoological Society of London

http://www.zsl.org/conservation/regions/africa/wildlife-wood-project/index,114,ZI.html

Wildlife Wood Project Cameroon Blog, Zoological Society of London

http://www.zslblogs.org/wildlife-wood-project-cameroon

Chapter 5: Habitat management

5.1: Avoiding clearance of HCVMAs during oil palm development

Produce GIS-based map of HCVMAs that clearly identifies 'Go', 'Go with caution' and 'No Go' areas for land preparation

GPS coordinates marking the boundaries of the HCVMAs should be taken and these data used to produce a GIS-based map that clearly identifies 'Go', 'Go with caution' and 'No Go' areas for land preparation. Production of these maps must be included as an output within the Terms of Reference for the HCV assessment team.

Clearly mark the boundaries of HCVMAs in the field

A GPS should be used to identify the position of the boundary, with reference to the GIS-based map of the HCVMAs. The boundary of these areas should be marked out using stakes or using brightly coloured paint to mark trees that form the edge of the HCVMAs. These boundaries should then be highlighted using signs to inform plantation employees and members of the local community are areas set aside for conservation (See Chapter 2: Delineating HCV Management Areas). To avoid social conflict, misunderstandings or land claims, communities *must* be consulted about the locations of HCVMAs during their development and once established, informed why boundaries and signs exists.

Control the activities of contractors

Contractors involved in clearing and preparing land for planting should be given clear and precise instructions regarding the location of areas that are 'No Go' and are off limits for planting. They should be guided by the plantation surveyors to ensure that they do not clear any HCVA by mistake, and the HCVMAs should be well marked before clearing (See above). Sanctions and penalties for clearing land within 'No Go' areas should be written into their contract with the company. Company employees are responsible for supervision and for oversight of contractors' work.

Avoid fragmenting HCVMAs and riparian buffer zones with roads wherever possible

Every effort should be made to develop roads outside of HCVMA boundaries to avoid fragmentation and disturbance.

Do not use fire for land preparation

The company should have a zero burning policy for land preparation.

5.2: Managing HCV Areas

Local communities: In Cameroon and Gabon, palm oil concessions will not overlap with legally defined community forest areas; Given the lack of transparency, in relation to land tenure regulations in West and Central Africa, and from land rights issues seen in SE Asia, it is essential to engage with local communities, authorities, and other stakeholders at all stages of development to adhere to the RSPO P&C and mitigated potential reputational risk . This may result in compensating people with existing land use rights to these areas.

If the communities do not give their Free, Prior and Informed Consent (FPIC) and waive their rights to the land, the company should manage these areas in collaboration with the people or community and with land use rights to the HCVMAs. It is an RSPO requirement that a Memorandum of Understanding (MoU) be established between the company and communities with land and natural resource use rights in the area, to establish cooperative land use (See Chapter 7: Engaging stakeholders). If no MoU is signed, this is recorded as a major non-compliance with RSPO regulations and if not addressed in 60 days will lead to either certification not being issued or removed .

Local government: In order to protect HCVMAs effectively, the majority of the area must remain within the boundaries of the company's concession. The company should be pro-active in engaging with the relevant local as well as central government departments. Depending on the reporting requirements of the country, this could include providing the relevant government departments with a copy of the HCV assessment and HCV management plan, explaining the function that each HCVMA fulfils and why it is important, as well as regularly informing these departments about the results of HCV monitoring. This communication could provide key information to land use planning departments looking to establish wildlife corridors. (See Chapter 7: Engaging stakeholders).

5.3: Preventing encroachment

People living in and around oil palm concessions will often consider that uncultivated areas not being used by the company are available to exploit. This frequently results in encroachment, illegal logging, mining and cultivation occurring within HCVMAs, which are set aside for conservation. Areas that are highly accessible by river or roads are

particularly vulnerable. The following measures can be taken to attempt to reduce these threats and maintain the quality of natural habitats within oil palm concessions.

- **Limit access:** In cases where local people do not have the right to use the HCVMAs, it may be appropriate to limit access to these areas. Options for achieving this includes, requesting the security guards to closely monitor traffic entering the access routes, or positioning a barrier to prevent access to the area. However, consideration must be given to the allowance of wildlife in and out of this area.
- **Signs:** Sign or sign boards can be used to clearly explain that certain areas have been set aside for conservation and any activities are prohibited. These sign boards should be in the local language, ideally accompanied by visual explanations for those with low literacy levels.

- **Plant 'useful' trees:** Planting native tree species that are of value to local communities at low densities within HCVMAs, ideally at the boundaries of the areas, can help to demonstrate that the area is being actively managed by a company. Allowing local communities to harvest non-timber forest products (NTFP) such as fruit or nuts from these trees can provide resources that may increase the incentive to protect these areas of natural habitat from damaging activities. This harvesting should be limited to the outer edges or 'buffer' zone of the HCVMAs, to reduce the disturbance to wildlife.

  However, it is important to maintain a balance between trees that are planted including those that are of value to humans and wildlife particularly fruiting species that are a food source. In West and Central Africa, possible options for planting NTFPs include kola trees (*Cola acuminata* and *Cola nitida*), fruit trees such as bush mango and African pear (*Irvingia gabonensis* and *Dacryodes edulis*), coffee, local medicinal plants and perhaps even rubber at low densities, if mixed with native species.

- **Patrols:** Regular patrols of the borders and interior of HCVMAs are the best way of deterring people from encroaching and carrying out activities that are prohibited in the area i.e. logging or mining. Preferably, each HCVMA should be visited by a patrol at least once a week, but at different times of the week. Of course, each area will be assessed to determine the most appropriate way to manage the trespassers Patrols I should involve stakeholders with the authority to address any illegal activities encountered. . This could mean forming joint patrols with representatives from the local government forestry or conservation department

Government departments or NGOs may be able to provide the company's patrol team with training, so that plantations use the same or similar system that is used in protected areas. If no suitable government partners are available, in certain countries plantation patrol staff may be awarded some authority or mandate to enforce legal and company regulations; for example, in Malaysia, company staff have had special training and gained qualifications as wildlife wardens, this gives them special legal authority to undertake basic enforcement against illegal activities. In addition, it may be beneficial to involve local people in patrols, since they can provide important local knowledge of the wildlife and communities around the plantation. Community rangers can also help to raise awareness within their own communities about the presence and purpose of the conservation areas, as well as the activities that are prohibited.

5.4: Forest restoration and enhancement

Restoration is the process of returning a disturbed or degraded ecosystem to as close of a condition to its originating, undisturbed state. Restoration can be expensive and require a long-term commitment to succeed, so where possible, it is essential to reduce the likelihood of disturbance to the natural vegetation wherever possible when establishing a plantation. Therefore, with the expansion of the palm oil industry in West and Central Africa, the emphasis should be on identifying and managing the natural vegetation in HCVMAs within plantations. Forest restoration in these cases, where natural vegetation exists, should not be of a primary concern unless HCV areas are poorly managed or a company takes over degraded land for planting.

Guidelines for forest restoration and enhancement are included in Appendix 1.

Useful references and resources
FORRU. 2008. *Research for Restoring Tropical Forest Ecosystems: A Practical Guide*. *www.forru.org/*
Mansourian, S. 2005. Practical interventions that will support restoration in broad scale conservation based on WWF experience. In: Mansourian, S., Vallauri, D. & Dudley, N. (Eds.) *Forest Restoration in Landscapes: Beyond Planting Trees*. New York: Springer.
Mudappa, D. & Raman, T. R. 2010. *Rainforest Restoration: A Guide to Principles and Practice*. Nature Conservation Foundation, Mysore. *http://moef.nic.in/downloads/public-information/Rainforest_Restoration_NCF_India_Web.pdf*

Chapter 6: Species management

6.1: Population management

In many cases, simply setting aside areas of natural habitat will not be sufficient to ensure the long-term survival of HCV species that remain within and around the oil palm concession.

In order to achieve this total long-term survival, some species will require active management.

To determine which species require active management it is necessary to:

- Identify threats to the survival of the target species.
- Gather more information about the population status of key species in the area (i.e. common, rare) and how it is changing over time to prioritise species that require management..

Identifying threats

The first step is to find out the extent to which different species are being hunted or captured for trade within and around the oil palm concession. This information can be gathered by:

- **Searching areas of natural habitat within the concession for signs of snares, traps or nets.** Each time a trap is found, the type of trap, its location and the date it was found should be recorded. If possible, the species it was aiming to capture should also be noted and then the trap should be destroyed or removed. This information can be used to estimate the pattern of hunting and fishing and the key areas and species that are being targeted[1].

- **Asking plantation staff, particularly security guards, to report hunters or fishermen sighted within the concession.** The report should include the area of the plantation they were sighted in, who was involved (i.e. plantation workers, people from a particular village), and how they were hunting or fishing; for example, whether they were using dogs or electro fishing.

[1] Further guidance for collecting this data can be found in Zrust et al., 2013, HCV Monitoring Protocol for Oil Palm Landscapes, ZSL, London. Full document can be found here: *http://www.sustainablepalmoil.org/files/2013/05/Threat_Monitoring_Protocol_FINAL-VERSION.pdf*

- **Visiting local markets to see which species are being sold**. If any rare, endangered or protected species are being sold, the observer should record as much information as possible; where the species was captured, what it is being sold for (e.g. for food, as a pet, for export), the price, how many individuals are available for sale, and how often they are captured or sold.

- **Carrying out informal interviews with people living in and around the concession to find out which species are being hunted, fished and traded.** Preferably, someone whom the interviewees will feel comfortable with should carry out the interviews. The interviewer should also have good knowledge of the local area and culture. When an interview is conducted, it is important to make it clear that the information provided will not be given to the government or police. Prepare a list of standardised questions that cover all the information required, prior to carrying out interviews, and to bring pictures of wildlife, to assist with species identification.

Determining the population status

The number of individuals of each species living in and around the concession will fluctuate naturally between seasons and years. Therefore, monitoring species effectively to see if a population is declining, increasing or remaining constant, it will understandably take a few years before there is any certainty (See Chapter 8).

Initially, priority for active management should be given to:

- **Species that are being hunted or traded at levels which are suspected to be unsustainable**

  Management: See Section 6.2

- **Species for which it is known that the population in the area is very small and isolated from other populations of the same species**

  Management: If a few individuals of a particular species are confined to an area of natural habitat and surrounded by oil palm with a strong indication that they would be unable to reproduce (i.e. all individuals are of the same sex, too old to reproduce, etc.), travel to find a mate or additional areas of their natural habitat for food, then it may be necessary to arrange for these individuals to be trans-located. This measure should only be considered if there is little opportunity for re-establishing connectivity with other individuals of the same species.

  Translocation is expensive and stressful for the animals involved, and the availability of habitat suitable for releasing animals is limited in many regions.

Approval for translocation should be obtained from the government body in charge of the wildlife management, and national, international and veterinary laws should be observed. All relevant CITES permits must be obtained and regulations adhered to. Prior to considering translocation, contact the local wildlife department and NGOs regarding the target species, for any advice before determining whether or not to translocate.

- **Species with very specific habitat requirements**

  Management: In situations where species are surviving in habitats that do not fulfil the requirements for their long-term survival, efforts should be made to make the habitat more suitable. This could include:
  - Planting plant species that form an important component of the species' diet.
  - Increasing the availability of characteristics of the habitat that a species may depends on i.e. for roosting, nesting, or mating.
  - Making it easier for wide-ranging species with large habitat requirements, or species that migrate between areas of suitable habitat, by establishing corridors, stepping stones, or rope bridges for arboreal species.

6.2: Management of hunting, fishing, and the use of natural resources

Communities who live within or around tropical forests have traditionally been dependent on hunting, fishing, and the collection of NTFPs for subsistence. In some places, this continues to be the case and in most situations where large expanses of natural vegetation remain, these practices are generally considered to be sustainable.

However, in other situations, where natural vegetation is being reduced due to increased access to more efficient equipment for hunting, changing lifestyles, and a growing trade in various species of wildlife, which have made significant contribution to the decline of many of the species (which are now considered to be threatened with extinction). Therefore, in many situations, it is necessary to regulate hunting, fishing, and the uses of NTFP to sustainable levels to ensure that the species being exploited does not become locally extinct.

The measures required to control hunting and fishing will depend on:

- **Who is involved?** This may be plantation staff, people living in local villages, nomadic tribes, a hunting club or wildlife traders.

- **Why are they hunting/fishing/collecting non-timber forest products (NTFP)?** This may be for subsistence, as a hobby, for commercial purposes or because the species is considered to be a pest.

- **Which species are they targeting?** Large mammals (duikers, antelopes, red river hogs, bush pigs and monkeys), smaller mammals (pangolin, rodents), birds, reptiles, and fishes may be targeted for hunting, trapping, or fishing within oil palm concessions. The NTFP that are commonly harvested, include rattan/cane, honey, medicinal plants, ornamental plants (orchids), and forest fruits.

  What equipment are they using? Possible hunting and fishing methods include traps, snares, shotguns, dogs, spears, poison, fishing rods and nets.

There are ranges of measures that can be used to control hunting and fishing. A combination of these measures will usually be required:

- **Signs or sign boards:** These should clearly state the company's policy and law relating to hunting, fishing and harvesting of NTFP in the local language accompanied by visual pictorial explanations.

- **Patrols and check points:** Patrols of HCVMAs and riparian zones should be carried out to demonstrate to hunters, fishermen and people collecting NTFP that the company has a ground presence in these areas, hopefully acting as a deterrent. The timing of these patrols should be varied and would ideally span the periods of day and night when hunters and fishermen are thought to be most active. It may also be possible to set up and man check points at the major access routes into the concession where people are suspected of entering for hunting, fishing or capturing wildlife (e.g. carrying a weapon late at night) should be questioned.

- **Enforcement:** Both the company's policy and all relevant international, national, and local regulations should be enforced; for example, snares or traps found in areas where the company prohibits it should be removed. People found to be in possession of, or hunting protected species, should be reported to the local wildlife department.

- **Include a clause that prohibits hunting, fishing and collection of NTFP in the code of conduct for all plantation employees:** This could apply to all areas within the concession or just to the HCVMAs and/or riparian buffer zones. Employees who break this code of conduct should be penalised accordingly.

- **Prohibit hunting and fishing of certain species during their breeding season. Prohibit or limit the use of weapons which are unselective or result in very high yields. Provide local people with licenses and quotas. Establish hunting and no hunting zone:** National laws will take precedence — it is important to be aware of the local hunting regulations, such as village and cultural laws, as well as what is legal or illegal in the country in question. It is recommended to contact the wildlife authorities and local government for more information on the hunting season, legal methods, licences, etc.

- **Provide local people with alternative resources:** For people who depend on hunting, fishing and the collection of NTFP for subsistence or as a means of income, providing these communities with alternative resources is likely to be the only way to reduce the pressure on vulnerable species. It is important that these alternative resources are sustainable and the communities involved are willing to switch. This could form part of the company's community development programme. If alternative sources are not provided this could displace the community's harvesting to other areas which could put them in conflict with other communities or result in unsustainable levels harvesting, causing wider degradation.

- **Raising awareness:** Both plantation staff and people living within and around the concession should be made aware of the company's policy on hunting, the relevant international, national and local regulations, and the importance of conserving biodiversity (See Chapter 7). However, it is important to be aware that alerting potential hunters/fishers/traders to the presence of rare, threatened or endangered species in the local area may result in increased levels of exploitation.

CASE STUDY: Compensate, mark, and release scheme

What? A compensate, mark and release scheme for softshell turtles (*Amyda cartilaginea*, IUCN Vulnerable*)* and Siamese Crocodiles *(Crocodylus siamensis,* IUCN Critically Endangered*)*

Where? REA Kaltim, Hulu Belayan, East Kalimantan, Indonesia

Aims:

1. To provide fishermen with a sustainable source of income, that can compete with the one-off income gained by selling individuals captured for export.
2. To assist in monitoring the population status of these species to enable collection of data on population structure (number of adults vs. juveniles; males vs. females caught) and population size (this can be estimated from the frequency that marked individuals are recaptured).

How?

- REA Kaltim requested that local fisherman contact them if they caught softshell turtles or Siamese crocodiles as by-catch. If possible before they were released each individual was too weighed and measured, the sex recorded, and finally tagged with a small resilient tag. The GPS coordinates of the location where it was captured as also recorded.

- The fishermen was paid between 10,000–20,000 IDR (US $1-2) and release the animal at the point of capture. Even if the individual caught has already been marked, REA compensates the fisherman as this provides important data for monitoring the population.

Resources needed:

Cost: In its first year the scheme received 30 reports of softshell turtle and 15 Siamese crocodile sightings giving a total expenditure of compensation to fisherman of approximately 900,000 IDR (US $90).

Equipment: GPS unit, scales, tape measure and a small allowance for a local assistant at the site (IDR 300,000/month (approximately US $30)).

Staff time: Scheduled visits to sites to photograph, measure, weigh and tag the individuals captured.

Progress to date: successes and challenges

- Of the 30 softshell turtle individuals that have been captured, only one has been recaptured, which suggests a reasonably large population.
- There is no effective way to estimate the number being traded, but there are indications that the level at which the softshell turtles are harvested, is sustainable at present.

Useful references and resources
Bennett, E.L. et al. 2007. Hunting for Consensus: Reconciling Bushmeat Harvest, Conservation, and Development Policy in West and Central Africa. *Conservation Biology*, 21(3), 884-887.
Gautam, K. H. & T. Watanabe. 2002. Silviculture for non-timber forest product management: challenges and opportunities for sustainable forest management. THE FORESTRY CHRONICLE 78 (6):830-832
Oldfield, S. (ed.). 2003. *The Trade in Wildlife: Regulation for Conservation*. London: Earthscan Publications Ltd.
Peters, C. M. 1999. Sustainable Harvest of Non-timber Plant Resources in Tropical Moist Forest: An Ecological Primer. *http://www.worldwildlife.org/bsp/publications/bsp/sustainable_eng/sustainable06-14-99.pdf*

6.3: Human Wildlife Conflict (HWC)

What is human-wildlife conflict?

Human-wildlife conflict (HWC) relates to the negative impacts of human activities on wildlife, ranging from deliberately killing or capturing animals to converting or polluting their natural habitat, as well as the negative impacts of wildlife on humans, such as damage to property, cattle or crops or being physical attacked.

Why does it occur?

The primary cause of human-wildlife conflict is competition to access natural resources. A key reason for this is the loss and fragmentation of forests due to land use changes, which has significantly reduced the area of suitable habitat available to many forest dependent species. The consequences of this are particularly serious for large mammals, which require extensive areas of habitat to meet their needs. If the forest available to these species is not sufficient or is highly fragmented, this can force these species to search for food or pass through human-dominated areas more frequently. Combined with increasing levels of human encroachment into forests, this has resulted in more frequent encounters between humans and wildlife, increasing the probability of conflict.

Which species are most commonly involved?

In oil palm plantations in Africa, HWC is most likely to involve elephants or primates (great apes, mandrills, etc.), but conflict can also occur between humans and other animals, including porcupines and crocodiles. In terms of economic cost, the cane rat

usually causes the most damage to crops in West and Central Africa. However communities are most affected by elephant or primate attacks. The negative perception of these species by communities is found to have worsened due to conservation efforts which focus solely on increasing the numbers and distribution of those species in areas where conflicts have occurred (Arlet & Molleman, 2007). This is another reason why raising awareness and education are important tools to reduce HWC.

Causes of HWC

The main causes of HWC are the human-wildlife interactions are increasing through the loss and fragmentation of habitat and the declining populations of prey species.

Why does HWC need to be managed?

HWC can result in injury or death for both humans and wildlife. It can also cause significant damage to oil palms and consequently have a high economic cost. Whilst some of the measures required to avoid or reduce HWC may initially be expensive, but the physical and socials costs by implementing them will be reduced meaning that they often become cost-effective in the long term. These measures are also crucial to enable humans and wildlife to coexist within landscapes dominated by oil palm. The most successful, long-lasting, and cost-effective measures tend to be preventative (proactive), while curative (reactive) measures seek to address problems when they occur or afterwards, or when preventative measures have failed.

How can it be managed?

In general, understanding the behaviour, movements, and ecology of wildlife can used to mitigate HWC. The first step in developing any HWC management plan is to determine which species are actually responsible for the damage caused. However, it is important to bear in mind that there is no definitive solution for HWC in West and Central Africa, especially regarding elephants and apes that are able to adapt their strategies over time, therefore requiring plans to also adapt accordingly. Patrols and a combination of alternating prevention methods are required to ensure an optimum efficiency.

Preventing HWC:

- ***Habitat protection***

Protecting sufficiently large, connected and suitable areas of natural habitat within oil palm landscapes is widely considered to be the most effective way to avoid HWC, since this most frequently occurs in areas where species do not have access to sufficient

habitat to meet their needs. The best way to achieve this is to ensure that sufficient, contiguous areas of forest are protected during the development of regional and site-level land use plans. In areas where oil palm development has already taken place, efforts should be made to maintain and enhance connectivity between suitable areas of natural habitat. Enriching the remaining areas of natural habitat with plant species which are known naturally occurring food sources for crop raiding wildlife species, such as chimpanzee may also help to reduce the potential for HWC and loss of earnings, as they will no longer use the oil palm kernel as a food source. (Chapter 5.4).

- ***Buffer zones***

Leaving cleared or shrubby areas 20–30 m wide along the border between areas of oil palm and forest may help to discourage chimpanzees from leaving the forest. However, if they are desperate for food or attracted by plant species growing in the buffer zone, they will still leave the forest. Therefore, it is essential that a buffer zone should be, in addition to rather than part of, the remaining areas of natural forest. These measures will be most effective when combined with repellents, barriers and patrols. However, it must be noted that buffer zones are not an effective means of discouraging elephants from leaving the forest.

- ***Barriers***

Both natural and man-made barriers have proved to be effective ways of reducing HWC. Different types of barriers will be required to limit the movement of different species. It is important to consider how this will alter the movement of this species and the impact this may have on both the wildlife population (i.e. would it fragment their habitat?) and other human populations (i.e. would this simply displace the risk of HWC to another area?). Constructing man-made barriers can be very expensive, particularly if they need to cover large distances, but this may be cost-effective in the long term. Priority should be given to protecting young oil palm, as this is most vulnerable to being damaged by wildlife.

What follow is the most commonly used barriers within oil palm concessions:

- **Trenches:** Building trenches that are at least 1.8m deep and 2.4m wide at the surface (they may get narrower as you get deeper) around the oil palm can help to prevent elephants entering and damaging the crop. However, trenches are not suitable in areas prone to soil erosion or in wetland areas, where they can cause

drainage. Trenches require regular maintenance to prevent erosion and can be very expensive to construct and maintained.

- **Canals:** Trenches filled with water can act as a deterrent to great apes entering the oil palm if they are deep and wide enough; however, not all great apes are afraid of water e.g. some wild born chimpanzee (Farmer 2002 cited by Hockings and Humle 2009) and elephants are able to swim across the canals. Canals also require regular maintenance to keep them free of debris and vegetation that may help great apes to cross, and the water level must also be maintained. Canals may pose a disease risk as well as a drowning risk for both great apes and humans. When constructing any earthworks such as canals or trenches, consideration must be given to how they may affect the hydrological management and the movement of other species in the area.

- **Electric fences:** These are considered by many plantation managers to be the most effective way of deterring wildlife that may cause damage to the oil palm, including elephants, chimpanzees, antelopes and bush pigs. As long as the voltage is limited to 12 volts, the risk of injury to both humans and wildlife is low. However, large elephants may be able to endure the pain in order to push down the fence, rodents may burrow under the fence and chimps may learn when the electricity is off or find a way to climb over the fence if there is suitable over hanging vegetation nearby.

Repellents

A variety of different repellents can be used to try and discourage wildlife from leaving the forest and entering the oil palm crop:

- **Loud noises:** Firecrackers, drums, shouting, vehicle horns and gunshots can be a reasonably effective means to deter elephants and great apes. However, if noises are made at regular intervals then wildlife can become habituated to it and learn to ignore it.
- **Chillies (*Capsicum* spp.):** These plants are avoided by elephants and may also help to deter chimpanzees, so planting them around the edge of the oil palm may help.
- **Light:** This can be used to deter wildlife that is known to raid the oil palm at night, including elephants, though its effectiveness is limited.
- **Bee hives:** These can act as deterrents to elephants as well as providing a source of income.

Patrols

Patrols in areas where there is a high risk of HWC are one of the simplest, economical and most effective ways of preventing conflict between humans and a wide range of

species. At the same time, these patrols can also help to reduce hunting, which will help to increase the prey available to carnivorous species and reduce the need for them to search for food beyond the forest. Patrols should be carried out at night to prevent conflict between humans and elephants and during the day to prevent chimpanzees from entering the oil palm. The use of vehicles will enable people carrying out the patrol to scare away any animals sighted using the lights, sound of the engine and horn.

Raising awareness

Training and awareness-raising programmes can help to educate both plantation staff and people living in and around the concession about HWC. In particular, for plantation staff on how to behave if an animal, that is considered to be a threat, is encountered in order to minimise the damage caused to both people and wildlife. Communities may also receive training on how to protect their crops and cattle from wildlife. Such programmes should also aim to educate people about the causes of HWC, including habitat loss and reduced availability of prey, as well as the importance of conserving these species (See Chapter 7).

Review of HWC mitigation in West and Central Africa

Crop-raiding represents a major source of HWC in West and Central Africa. Several studies have been conducted to identify which species cause the most damage, the pattern and intensity of this damage and how to improve mitigations techniques. Physical barriers are commonly used to prevent conflict between wildlife and human populations; however, they have known limitations such as practicality and cost/effectiveness. No single type of barrier can offer protection against every single species, in particular, those who are particularly strong or nimble. Baboons, leopard, chimpanzees or cane rats for example, have all been known to pass through fences and enter enclosures (Distefano, 2005, Arlett & Molleman 2007, Hockings & Humle 2009). Physical barriers may also have negative impacts on the ecological equilibrium of a region, disrupting the dynamics of a population, and the movement of the species through the landscape (Distefano, 2005) and can be considered as unsustainable for long-term human-wildlife coexistence (Naughton-Treves & Treves 2005). When planning HWC strategies to mitigate crop raiding, landscaping, seasonal variation and patrol intensity should also be taken into consideration

A study by Arlet & Molleman (2007) in Dja Reserve, Cameroon, highlighted that although the unpredictability and intensity of occasional damages caused by larger mammals (e.g. chimpanzee and elephants) may induce resentment, it was rodents, particularly cane rats, which caused the most damage to crops. Since cane rats are not endangered, frequent fencing maintenance, fallow management around agricultural ground to reduce potential breeding sites and increased trapping of cane rats to limit crop raiding, were recommended to reduce HWC.

In a similar study, based in Gashaka Gumti National Park, Nigeria, Warren et al. (2007), showed that crop raiding intensity varies with distance to protected areas, as most species do not travel long distances to forage (one well known exception, the baboon). In this instance, patrols represented the most efficient and simple deterrent to limit crop raiding although this can be costly and requires planning.

In a study conducted in Bossou, Republic of Guinea, (Hockings et al. 2009),it was suggested that chimpanzees might increase raiding on plantations when there was a shortage of wild fruit. Consumption of oil palm fruits by chimpanzees appeared to be significantly higher during this scarcity period (May to November, crop raiding picking from September to November) due to the African oil palm (*Elaeis guineensis*) produces fruits throughout the year. Recommendations to minimise such conflicts, included conserving secondary forest tree species that produce sugar-rich fruits throughout the year to be used as fallback food by wildlife during the months of wild fruits scarcity and act as a buffer against crop raiding.

Finally, community-based conservation programmes that promote tolerance and awareness of the intrinsic value of wildlife and nature are becoming increasingly widespread throughout Africa. One example is in Waza National Park, in Cameroon, where the park's management plan authorised the consumption of natural resources in exchange for people's cooperation, the communities living in the vicinity of the park have, in response, demonstrated a positive understanding of the necessity to protect forests and wildlife for future generations (Hans, 2003). Although not all local needs can be met in the context of conservation, involving local communities in wildlife management and providing concrete benefices is necessary to avoid long-term negative impacts on conservation efforts (Distefano 2005).

There is no single solution to human-wildlife conflict and mitigation often relies on a combination of different techniques. It is important to evaluate the situation and adapt mitigation strategies to the local context, community's level of involvement, terrain limitations and species-specific issues.

Mitigating HWC:

Compensation

People who are injured, or whose property is lost or damaged by HWC will often expect compensation of some kind. However, whilst this can be valuable in the short term, it will not help to solve the problem in the long term and can create conflict both within communities and between the company and the community. Compensation would have to be first agreed with the authorities, but despite being covered by law (e.g. Gabon, Cameroon), it has been found difficult to enforce. In case of accident involving human safety or damage to crops, those involved should refer first to the relevant wildlife authorities. In some instances, the destruction of problematic animal may be ordered by ministerial order (e.g. Cameroon).

Translocation

The translocation of individual animals involved in HWC should be a last resort as this will not solve the problem in the long term and may simply move the problem to another area. It should only be considered if there is no other option for the survival of the animal or it has frequently been involved in attacks on humans. Capturing and trans-locating animals is risky for both the animal and people involved, as well as being a very expensive procedure, and should only be carried out by experienced and well-equipped professionals from relevant NGOs or rehabilitation centres. It is important to monitor trans-located individuals once they have been released to ensure that they find a suitable territory or area of habitat and do not try and return to the location from which they were trans-located. If successful, trans-located individuals can help to enhance the viability of a population of the species in a more suitable area of habitat at a different location.

Table 7: Advantages and disadvantages of different approaches for managing Human-Wildlife Conflict, for two key endangered species responsible for conflict situations.

Measure	Advantages	Disadvantages	Elephant	Chimpanzee
Habitat protection	Addresses the root cause Long-term solution	Ultimately depends on landscape level land use planning often difficult to influence.		
Buffer zones	Relatively cheap	Chimpanzees will still cross f desperate for food. Can cause HWC in other areas.		
Barriers: Trenches	Semi-permanent	Expensive to construct. Only suitable for flat and dry terrain. Heavy maintenance needed to prevent erosion. Can cause HWC in other areas.		
Barriers: Canals	Semi-permanent	Expensive to construct. Can be difficult to maintain water level in the dry season. Stagnant water is a disease risk. Can cause HWC in other areas.		
Barriers: Electric fences	Semi-permanent Versatile Less risk of injury than barbed wire fence	Expensive to construct. Not always effective. Can cause HWC in other areas.		
Repellents	Cheap	Habituation		
Patrols	Relatively inexpensive Can be put into action immediately	Temporary effect. Dangerous. Labour intensive.		
Raising awareness	Preventative Inexpensive Applicable for all HWC species	Not necessarily effective. Labour intensive.		
Translocation	Long-term effect if whole herd trans-located	Very expensive. Temporary, if only some individuals are trans-located. Requires trained personnel. Dangerous for both the animals and people involved. Shortage of suitable locations to release trans-located individuals.		
Compensation	Immediate relief to victims	Does not solve the problem. Can create social conflict.		

Useful references and resources
Arlet, M.E. & Molleman, F. 2007. Rodents damage crops more than wildlife in substance agriculture on the northern periphery of Dja Reserve, Cameroon.
Chong, D. K. F. and Dayang Norwana, A. A. B. 2005. Guidelines on the Better Management Practices for the Mitigation and Management of Human-Elephant Conflict in and around Oil-Palm Plantations in Indonesia and Malaysia, Version 1. WWF-Malaysia, Petaling Jaya.
Desilets, M. (undated) Human-wildlife conflict in and around oil palm plantations. Orangutan Land Trust.
Distefano, E. 2005. Human-wildlife conflict around the world: collection of case studies, analysis of management strategies and good practices. *http://www.fao.org/SARD/common/ecg/1357/en/HWC_final.pdf*
Hans, B. 2003. Local perceptions of Waza National Park, northern Cameroon. *Environmental Conservation*, **30**(2): 175–181.
Hockings, K.J., Anderson, J.R. and Matsuzawa, T. 2009. Use of wild and cultivated food by Chimpanzees at Bossou, Republic of Guinea: Feeding dynamics in a Human-influenced environment. American Journal of Primatology 71: 636-646.
Hockings, K. and Humle, T. 2009. Best Practice Guidelines for the Prevention and Mitigation of Conflict Between Humans and Great Apes, IUCN/SSC Primate Specialist Group (PSG). Gland, Switzerland. *http://data.iucn.org/dbtw-wpd/edocs/SSC-OP-037.pdf*
Naughton-Treves, L. & Treves, A. 2005: Socio-ecological factors shaping local support for wildlife: crop-raiding by elephants and other wildlife in Africa. - In: Woodroffe, R., Thirgood, S. & Rabinowitz, A. (Eds.); People and wildlife: conflict or coexistence. Cambridge University Press, Cambridge, pp. 252-277.
Orangutan Conservation Services Programme (2010) Best Management Practices for Orangutan Conservation: Oil Palm Plantations.
Sukumar, R. 2003. The living elephants: evolutionary ecology, behaviour, and conservation. Oxford University Press. New York.
Thirgood S, Woodroffe R, and A Rabinowitz. 2005. The impact of human–wildlife conflict on human lives and livelihoods. In Thirgood *et al.* 2005. *People and Wildlife: Conflict or Coexistence.* Cambridge University Press. Cambridge UK.
Tweheyo, M., Hill, C.M. & Obua, J. 2005. Patterns of crop raiding by primates around the Budongo Forest Reserve, Uganda. Wildl. Biol. 11: 237-247.
Warren, Y., Buba, B. & Ross, C. 2007. Patterns of crop-raiding by wild and domestic animals near Gashaka Gumti National Park, Nigeria. International Journal of Pest Management 53(3): 207-216.
WWF. 2008. Common Ground: Solutions for reducing the human, economic and conservation costs of human wildlife conflict. Species Programme, WWF International.
Yuwono, E., Susanto, P., Saleh, C., Andayani, N., Prasetyo, D. and Utami, S. 2007. Guidelines for Better Management Practices on Avoidance, Mitigation and Management of Human-Orangutan Conflict in and around Oil Palm Plantations. WWF-Indonesia.

Chapter 7: Engaging stakeholders

7.1: Raising awareness

If efforts to conserve HCV species and habitats within and around oil palm concessions are to be successful, it is essential that management interventions are supported by all of the stakeholder groups that will be involved in or impacted by their implementation. This includes:

- Local government
- Plantation management
- Plantation workers
- People living in or around the plantation, particularly those involved in activities that have a negative impact on forest and wildlife, such as hunting, logging, mining, etc.

These stakeholder groups are more likely to be supportive of the measures needed to maintain and enhance HCV species and habitats, if they are well informed about what is being done and understand why it is important. For example, people are more likely work with companies to manage hunting levels if they understand that hunting certain species is illegal and/or is risking the local extinction of a certain species, in particular those that have an economic or cultural value to the community, meaning that if it becomes locally extinct the benefits it provides to both humans and the environment would be lost.

For an awareness-raising programme to be successful, it must have a clear and specific aim. For example, this could be to educate potential hunters or wildlife traders from local communities about both the company's policy and national regulations relating to these activities. Alternatively, the aim could be to educate plantation workers and local communities about the importance of maintaining water quality, highlighting activities that cause pollution and how this can be avoided. The programme has to have specific and measurable objectives against which its success can be evaluated. For example, the participants will be able to name more protected species at the end of the programme that before and are aware of their protected status. This will help to decide whether it is worthwhile to repeat the activity designed to raise awareness, or whether a different approach may be more effective.

Case-study: ZSL Wildlife Wood Project and community awareness in Cameroon

What? Partnership between the Zoological Society of London, a local NGO, ASTEVI (Association Terre & Vie) and the timber companies, Pallisco and SFID, to raise awareness of local communities about wildlife conservation within timber production forests.

Where? Pallisco and SFID timber production forests in Cameroon

Aims:

1. Focus on providing information about "the classification of protected species", and improving the understanding of villagers regarding species' legal protection status
2. Inform rural communities about Wildlife laws and the risk of zoonotic disease transmission in the forest
3. Raising awareness of legislation regarding hunting of wild meat to improve involvement of local communities to wildlife management initiatives by changing their perception of wildlife management and conservation measures
4. Engaging with local communities potentially affected by the companies' activities

How?

In 2010, a roadshow was held in 11 villages along the Abong-Mbang – Lomié road axis in Eastern Cameroon. This road is flanked by the Dja Reserve, a World Heritage Site, and three timber concessions allocated to Pallisco. The roadshow was used to improve the presentation of information to local people during village meetings.

Education materials: documentaries, interactive role play games and other activities.

In 2011, based on the success of the previous campaign, a larger-scale education campaign was launched which aimed at raising awareness within local communities regarding their traditional hunting rights, the rules and regulations regarding the exploitation of wildlife resources and wildlife management. This roadshow was held in 49 villages flanking Pallisco's concession.

Education materials: short sketches, video sequences from documentaries as well as PowerPoint® presentations, leaflets on Wildlife Laws and on 10 Basic Rules on how to Avoid Zoonotic Disease Transmissions in Forest Camps, (the transmission of diseases between wildlife and humans (zoonotic) were distributed during screening sessions.

Resources needed:

Motor tricycle, leaflets, screening facilities, education materials (e.g. videos, Power point®)

Average cost: only $1 per participant (900fcfa/person)

Progress to date - success and challenges:

- 2010 campaign: 1730 inhabitants of the Haut-Nyong District attended one of the 11 meetings organised by ASTEVI and ZSL
- 2011 campaign: 4816 inhabitants of the Upper-Nyong Department attended one of the screening sessions, over 500 leaflets were also distributed to local villagers during the sessions
- Performance monitoring: 402 questionnaires were completed by participants over the two campaigns

Results:

- Before the screening less than half of attendees were able to correctly attribute the legal status to an animal species. The concept of classes of protection for different species was not fully understood.
- Afterward the screening, interviewees demonstrated a good level of understanding of their traditional hunting rights.
- A majority of participants recognized that commercial hunting and poaching represent a risk of depletion for food security and livelihoods for people who depend on these natural resources as well as for the survival of many animal species and the forest ecosystem.
- On average 9 out of 10 villagers declared that they were willing to contribute to protecting biodiversity in their communities (in particular interest was shown in

contributing to law enforcement, developing alternative sources of protein or developing educational programs for their own community).

One of the greatest successes of the roadshow has been its capacity to attract larger audiences to screening sessions than usual village meetings. This has led the timber company, Pallisco, to hire ASTEVI staff to carry out a parallel programme aimed at informing local communities about Pallisco's own actions in relation to their practices to limit their impact on the environment.

References

Wildlife Wood Project, Zoological Society of London

http://www.zsl.org/conservation/regions/africa/wildlife-wood-project/index,114,ZI.html

Wildlife Wood Project Cameroon Blog, Zoological Society of London

http://www.zslblogs.org/wildlife-wood-project-cameroon

CASE STUDY: HCV species education and awareness programme

What? Orangutan education and awareness programme

Where? Wilmar Central Kalimantan Project, Indonesia

Aims:

1. To educate plantation staff about orangutans, including their ecology, the threats they face and the measures needed to conserve them.
2. To raise awareness amongst plantation staff about the company's Standard Operating Procedure relating to the conservation of orangutans and their habitat.

How?

- A series of Orangutan Education Events were arranged on different estates. Events were held during the day for plantation management and in the evening for plantation workers and their families. A register of attendance was taken for the plantation staff and workers invited to attend each event.
- Evening events for workers and their families were held outside on a groundsheet in front of a projector set up near the workers' accommodation. Each evening session was attended by up to 400 people.
- Each event lasted 2–3 hours and consisted of several presentations, interactive songs and games, and a short film about orangutans and forest destruction. This was facilitated by three people from the education team at Yayorin, an Orangutan Conservation NGO based in Pangkalan Bun, Central Kalimantan.
- Each event was opened by the company's Conservation Manager, who explained the necessity of raising awareness about orangutans, the importance of conserving HCVs within oil palm concessions, as well as the company's SOPs, relating to the conservation of orangutans and their habitat. This was followed by presentations from Yayorin, who provided further information about orangutans, their habitat and ecology, and the threats to the survival of this species. A representative gave the final presentation from the BKSDA (the Ministry of Forestry - provincial government wildlife department), who explained the Indonesian laws and regulations relating to orangutans, which are a protected species in Indonesia, as well as measures that can be taken to avoid human-wildlife conflict.
- At the end of each event, the audience was given orangutan stickers Posters summarising the key messages from the presentations, in particular the company's Standard Operating Procedures relating to the conservation of orang-utans, their habitats and the national laws that protect orangutans, were also put up in communal areas across the plantation estates including offices and housing complexes.

Resources needed:

- Transport, food and accommodation for representatives from Yayorin and the BKSDA.
- Groundsheets, an overhead projector and refreshments.
- Orangutan stickers – USD $1,260 for 6,000 stickers.
- Orangutan posters – USD $6.3 to print a 1m x 1.25m poster.

Similar to the Orangutan education and awareness programme, methods and materials should be used as part of an awareness-raising programme and the content should be carefully tailored to the targeted audience. Factors to consider include:

- What is their existing level of knowledge and understanding of the issue?
- What is the most appropriate forum or medium for engaging with them?
- What is the best language in which to communicate?
- Can they read and write?
- Who would be able to engage with them most effectively?

There are a wide variety of methods and materials that could be used to raise awareness. These include:

- Sign boards
- Producing and distributing leaflets, stickers, posters, or calendars
- Road shows or presentations
- Lessons in plantation schools
- Field trips to the HCVMAs
- Discussions during community meetings
- Explanation of particular Standard Operating Procedures during the morning roll call for plantation workers

CASE STUDY: Raising awareness of HCV species

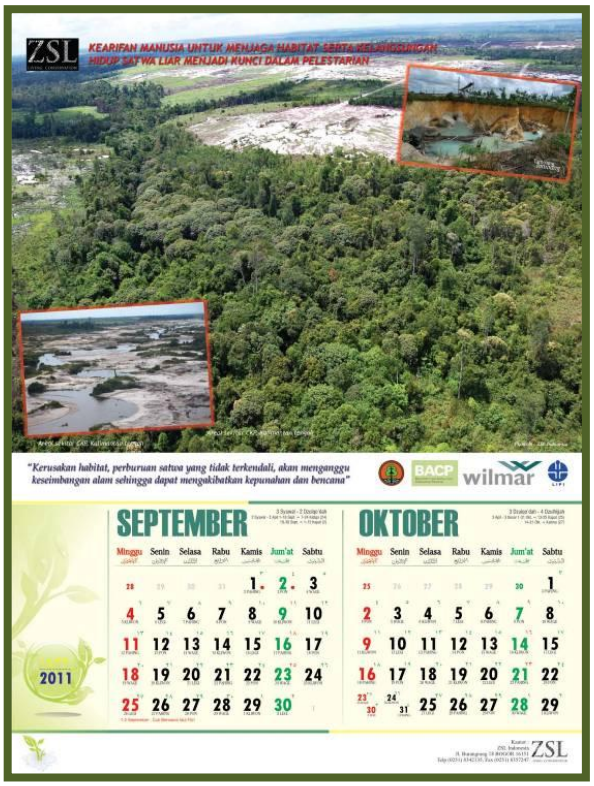
What? A calendar to raise awareness about HCV species and habitats

Where? Wilmar plantations throughout Sumatra and Kalimantan

Aim: To raise awareness amongst plantation staff and communities living in and around the plantation about HCV species and habitats, the major threats, and the importance of conservation.

How?

- Each page of the calendar was designed to explain what HCVs are, the role of different species and habitats and the importance of conserving them within oil palm landscapes.



- The messages contained within the calendar included:
  - The importance of conserving areas of natural habitat within oil palm concessions for wildlife and the provision of ecosystem services and people.
  - Pictures of species found within and around the plantations that are protected by the Government of Indonesia, listed as Critically Endangered, Endangered or Vulnerable by the IUCN, or listed as Appendix 1 or Appendix 2 by CITES.
  - Pictures of species found within and around the plantations that play an important role in seed dispersal and pest control.
  - The importance of clean water for both people and the environment.
  - The impact of mining and logging on natural habitats and the potential long-term consequences of this.

- The calendars were distributed to plantation staff and workers, as well as villages within and around the estates at a variety of events. These included a series of environmental education events arranged by the company for plantation staff, signings of MoUs with local villages, as well as any other interactions with people living in or around the estates.

Resources needed:

- Cost of printing 4,800 calendars (45 x 60 cm) was approximately USD $5,240
- Transporting calendars from printers to the various plantations

Progress to date - successes and challenges:

- The calendars were received enthusiastically by plantation staff and people living in and around the plantations and in the majority of cases were hung up in their homes.
- The calendars provided a useful entry point for more detailed discussions between the company and people living in and around the estates about HCVs and the actions that must be taken to conserve them.
- It is difficult to tell whether the people who received the calendars have fully understood the information contained in them. It would be necessary to measure this in some way in order to gauge the effectiveness of the calendars as a means of raising awareness.

CASE STUDY: Education camps

What? Regular Conservation Education Camps for local school children

Where? REA Kaltim, Hulu Belayan, East Kalimantan, Indonesia

Aims:

1. To provide education in forest biology and practical conservation tips for children and teachers in the hope of inspiring a greater appreciation and respect for their natural surroundings.
2. REA hopes children who participate in these nature camps will also educate and inspire their parents to appreciate and respect the forest and wildlife that remains within and around the oil palm plantation.

How?

1. Conservation Edu-Camps are held 4–6 times per year.
2. Each Nature Camp is run by at least 4–6 staff from REA KON (led by the Community Unit) and 4 teachers.

3. For each Nature Camp, REA invited 15–60 children aged 9–12 (SMD Class) from one of the plantation schools to spend two nights and nearly three days at REA's field station on the edge of the forest.
4. During the weekend the children are divided into groups of 4–5. Each group is given a different topic to focus on, such as trees, flowers, spiders or beetles, which they spent time in the forest searching for. With help from the REA KON staff, the children then tried to identify everything they have collected or taken photos of. At the end of the weekend, one person from each group gives a presentation to the whole group, explaining what they found and learnt. The weekend finishes with a Question & Answer session with all the staff.
5. The weekend activities also include various games and films relating to the environment.

Resources needed:

Staff: At least 4–6 staff and 4 teachers to lead the group of children.

Logistics: Usually the children bring their own tarps or tents and food. The estate provides transport for children from the emplacement schools. REA KON provides the transport for children from the village.

Cost: Additional costs of holding the camps are small; usually limited to food for the staff and prizes for games or competition winners.

Progress to date - successes & challenges:

- Approximately half of the school children invited were not allowed to attend the Nature Camps as their parents were nervous about letting them spend time in the forest. However, when these children heard stories from their friends who did participate, REA found that they pressured their parents to allow them to attend the next one.
- So far, REA's Nature Camps have mainly involved children from the plantation schools, as it is more difficult and expensive to arrange transport to the field station for children from the village schools.

7.2: Collaborative management of HCV Management Areas

In many cases, the effectiveness of efforts by a single palm oil producer to maintain and enhance HCV species and habitats will depend on the actions of neighbouring stakeholders, including companies and local communities, as well as government authorities. The conservation of large contiguous areas of natural habitats, species with large habitat requirements, and ecosystem functions such as the maintenance of water quality for downstream communities, requires action at a larger landscape level, spatial scale, which goes beyond a single oil palm concession.

A further reason is that the decisions and activities of other stakeholders operating within the landscape have the potential to undermine efforts being made to conserve HCV species and habitats within a single oil palm concession; for example, in Indonesia, local government authorities may remove areas from a company's location permit or land use title that have been set aside for conservation because this land is considered to be idle.

Working collaboratively with neighbouring companies, local communities, local governments and NGOs to manage HCVMAs has great potential to overcome these issues.

How to work with…

Neighbouring companies

In situations where neighbouring companies who already have collaborative agreements in place to build and maintain roads and other infrastructure, this can provide a good starting point for developing a collaboration concerning the management of HCV species and habitats. Communication between consultants prior to, during, and after conducting HCV assessments on neighbouring oil palm concessions is another way to help to promote collaborative management of HCV species and habitats. This is particularly important if the HCVMAs delineated border or extended into the neighbouring concession.

Third parties, particularly NGOs, have facilitated several of the collaborations that have been established between neighbouring oil palm concessions so far, in particular facilitating forest connectivity between different concessions

Ways in which neighbouring companies could collaborate, in terms of managing HCV species and habitats include:

- Establishing a joint team to patrol the HCVMAs and enforce policies and regulations relating to hunting, fishing, encroachment, logging, etc.
- Establishing joint teams to monitor the condition of HCV species and habitats (See Chapter 8).
- Establishing a joint nursery for forest restoration and enhancement
- Sharing the cost of purchasing aerial photography or satellite imagery to identify the potential for enhancing connectivity between remaining areas of natural habitat within the concession and the surrounding landscape.

Collaborating on these activities would help to reduce the cost of implementing effective HCV management. It may also enable people with specific skills to be employed such as managing a nursery or conducting wildlife monitoring, which a single company may be unable to justify. It can also help to improve communication between adjacent companies with regards to the presence of key species and threats within the surrounding area.

It may be necessary to establish a MoU between all of the parties involved which clearly states the objective of the collaboration and the role of each party.

Local communities

In situations where local communities have the right to use areas that have been designated as HCVMAs, it is essential to involve them in managing these areas to be successful. In order to establish a collaborative management agreement, the first step is to identify which stakeholders have a right to use the area in question, how they are using it, and how this may conflict with the company's management objectives for the area. This process of stakeholder consultation should be used as an opportunity to ensure that people living in and around the oil palm concession are fully aware of any actions that the company is taking or planning to take in order to maintain and enhance HCV species and habitats. It should also aim to identify potential solutions to any conflicts between the ways in which the company and the local community wish to manage the area.

For example, it may be necessary for the company to establish community development programmes to provide an alternative source of income for people that have previously relied on extracting resources from the HCVMAs. However, it is generally acknowledged that allowing local people to continue to use forest resources, but perhaps less intensively than before, is less likely to lead to conflict between the company and the community than if attempts are made to prevent these people from entering the

HCVMAs. This process of stakeholder consultation is likely to be more successful if it is facilitated by a neutral, third party.

It may be necessary to formalise any agreements reached between the company and the local community about how the area in question will be managed with a MoU, which outlines the responsibilities and commitments of each party.

Local governments

If it is possible to establish a MoU with the relevant government department, outlining a commitment by both parties to conserve a habitat of particular importance, then this may also help to secure these areas in the long term beyond the life span of the current company's involvement in the landscape.

In certain circumstances it may also be very valuable to collaborate with local government authorities with expertise in wildlife and forest management. This is particularly important when tackling issues such as human-wildlife conflict and encroachment. These departments may also be able to provide advice, expertise and resources to assist in implementing training for patrol teams, conducting awareness-raising events and carrying out forest restoration.

NGOs and scientific research institutions

NGOs working to conserve species and habitats in the region of the oil palm concession, as well as universities and scientific research institutions, can be a useful source of technical advice regarding the measures needed to maintain and enhance HCV species and habitats more effectively. Examples of ways in which they may be able to assist include:

- Monitoring the condition of HCV species and habitats on a periodic basis.
- Assisting in training company employees or local communities to carry out HCV monitoring.
- Developing resources for and assisting to implement awareness-raising campaigns.
- Advising on and responding to cases of human-wildlife conflict.
- Providing technical and practical assistance with forest restoration.

Chapter 8: HCV monitoring and adaptive management

Purpose of HCV monitoring

Monitoring is essential in allowing managers to answer two key questions:

1. Are the management interventions and Standard Operating Procedures designed to maintain and enhance HCV species and habitats being implemented properly?

2. Are these management interventions having the desired outcome? This is important, as it tells managers when the current management interventions are not being effective and need to be adjusted.

How to establish a monitoring programme

In order to answer the questions above, HCV monitoring should incorporate:

Operational monitoring: This involves carrying out simple checks on a regular basis to ensure that management interventions are being implemented as agreed. This does not require specific expertise, so can usually be carried out by existing plantation employees on a weekly or monthly basis as considered appropriate. This may involve:

- Checking that sign boards are in place.
- Checking that boundaries of the HCVMAs are clearly demarcated.
- Checking that pesticides and fertilisers are not being applied in riparian zones or other sensitive habitats where this is prohibited.
- Checking that patrols to deter and detect hunting, fishing, encroachment and illegal logging are being carried out according to the agreed schedule.

Effectiveness monitoring: This involves periodically assessing the condition of HCV species and habitats targeted by management interventions to determine whether management objectives are being achieved. Conducting such assessments will require at least a basic level of expertise in biodiversity, ecosystem services and anthropology, so it may be necessary for the company to employ scientists or consultants specifically for this purpose. However, effectiveness monitoring will only need to be undertaken seasonally or annually, depending on what is being measured. This may involve:

- Biodiversity assessments to estimate the population size of a rare, threatened, or endangered species for which measures are being taken to improve the habitat or reduce a threat, such as hunting.
- Obtaining aerial photographs or satellite imagery to assess changes in the condition and area of natural habitat within the concession.
- Conducting vegetation assessments in areas which are being restored.
- Assessing the level of soil erosion.
- Water quality testing (entering and leaving the plantation; in some cases, rivers may flow from the plantation into an HCVA).
- Socio-economic surveys to assess whether or not local communities' basic needs continue to be fulfilled by the HCVMAs.

What should be monitored?

The purpose of monitoring is to provide managers guidance about whether or not the measures being implemented are achieving this goal. It is therefore essential that the species or habitats monitored be directly linked to the management objectives. Preferably, monitoring should also be linked to a specific management intervention, so it can easily be determined whether or not this is having the desired impact. In some cases it will be possible to monitor the condition of the HCV species and habitats that form the focus of management interventions directly. However, in many cases it may be more effective to monitor indicators of this. For example, it can be very difficult to accurately monitor changes in the population size of rare, threatened or endangered species. Therefore, it may be more useful to monitor changes in habitat quality or availability of suitable prey or nesting sites.

For an indicator to be useful it must be:

- **Measurable:** Quantitative results are necessary to accurately detect change over time.
- **Relevant:** Changes in the condition of the indicator must provide useful information about whether management objectives are being met.
- **Simple and cost-effective to measure:** Does not require specialists to measure, but trained in-house staff, with a single indicator species showing the trends in positive or negative changes that occur across the landscape.

Once it has been decided what will be monitored in relation to each management objective, it should be incorporated into the management plan.

Table 8: Examples of indicators for monitoring whether specific management objectives are being achieved

Management objective	Indicators
Reduce levels of hunting	• Number of snares/traps found during regular patrols of HCVMAs. • Annual estimates of the size of the target population. • Number of hunters entering the plantation.
Restore an area of degraded forest to its undisturbed state	• Annual photos taken from the same angle at the same point. • Permanent vegetation plots where tree density can be measured on an annual basis. • Annual biodiversity surveys to assess the ability of wildlife to use the restored area. • Soil erosion plots on lower, middle, and higher slopes, repeated several times.
Reduce water pollution from the plantation operations	• Measure the difference between the water quality at inlets and outlets from the plantation.

What methods should be used to monitor and how frequently should this be carried out?

A variety of different methods may be involved in monitoring. These may include:

- Patrols
- Biodiversity assessments
- Water quality monitoring
- Socio-economic surveys
- Periodically taking photographs

The frequency that monitoring should be carried out depends on how quickly a response to the management intervention is expected, how sensitive a particular indicator is to change and the severity of the threat which a management intervention is aiming to reduce.

It is essential that once a protocol for monitoring has been decided upon it be used consistently to monitor changes in the indicator being assessed. If not, there is a risk that changes detected in the indicator being measured are a result of differences in the methodology used to measure it and do not accurately reflect a change in the condition of the species or habitat that is being targeted by a particular management intervention.

Who will be responsible for monitoring?

Implementing an HCV monitoring plan may involve a wide variety of different people. This could include:

- General plantation managers
- A dedicated HCV management team
- Security teams
- Members of the local community
- NGOs, consultants or scientists
- Local government authorities

The HCV monitoring and management plan should clearly identify a company employee who is responsible for ensuring that each component of the HCV monitoring programme is implemented. This should include any preparation required for monitoring, such as training the staff that will carry out patrols, purchasing equipment or engaging consultants, as well as reporting, analysing and acting upon the results of the monitoring.

How will the data be managed and analysed?

A system for reporting and managing the data collected as a result of monitoring should be established before monitoring begins. For example, data may initially be recorded using paper data sheets, but could then be transferred to an electronic database to facilitate data analysis and make it easier to keep long-term records. It is also important to decide how the data will be analysed in order to determine whether management objectives are being achieved and if management interventions are effective.

The data should be analysed in sufficient time for a management response to be made quickly enough to address any negative changes detected in the condition of the species or habitats being targeted by management interventions.

When will a management response be necessary?

The overall purpose of monitoring is to provide feedback on whether the current management interventions are having the desired impact, when this is not the case, these interventions can be adjusted to become more effective. This is known as adaptive management.

Box 2: Definition of adaptive management

Adaptive management is a planned and systematic process for continuously improving environmental management practices by learning about their outcomes. Adaptive management provides flexibility to identify and implement new mitigation measures or to modify existing ones during the life of a project.

When deciding which indicators are going to be measured as part of a monitoring programme, it is also necessary to determine the expected result would suggest if that interventions were being effective and the management objective is being achieved, i.e. the level of the indicator decreases, increases, or remains constant in comparison to the baseline established by the first few measurements.

If possible, it is also useful to set a threshold, beyond which the level of change observed is considered to be significant enough for action to be required. This could be either a positive change, which may suggest that a particular management intervention is no longer necessary, or a negative change, which may suggest that additional actions may be needed to mitigate this negative impact on the species or habitat in question.

Useful references and resources
ZSL HCV Threat Monitoring System *http://www.sustainablepalmoil.org/files/2013/05/Threat_Monitoring_Protocol_FINAL-VERSION.pdf*
HCV Resource Network website *http://www.hcvnetwork.org/about-hcvf/the-hcv-process-folder/monitoring-high-conservation-values*
HCV training and capacity building *http://www.proforest.net/projects/hcv-training*

APPENDIX 1: Forest restoration and enhancement

Restoration is the process of returning a disturbed or degraded ecosystem to a condition that is closer to its undisturbed state. In many cases, detailed information about the previous condition of forest at the site being restored is not available. In these situations, nearby areas of undisturbed forest with similar soil, climate and elevation should be identified as the 'natural state' target to be achieved.

In the case of tropical forests, which are very diverse and complex ecosystems, it will take decades or even centuries before the structure and species composition is comparable to the target ecosystem. However, in the short term, the aim is to recreate a structure and species composition that will allow the ecosystem to perform its natural ecological functions. This includes providing habitat for wildlife, protecting watersheds from flooding and pollution, preventing soil erosion and contributing to nutrient cycling.

In addition to planting vegetation, forest restoration may also involve controlling or removing invasive species and protecting the site from harmful disturbances such as increased nitrogen flow.

In what situations is it necessary to restore or enrich natural habitats within oil palm concessions?

Restoring natural vegetation in riparian zones or steep areas that have been planted with oil palm

Riparian zones and steep areas (>40%) should not be planted with oil palm. Where planting has occurred, steps should be taken to restore the natural vegetation in these areas for the following reasons:

- To bring the plantation into compliance with relevant national regulations.
- To comply with the RSPO P&C (2.1).
- To restore the ecological function of these areas, this includes reducing soil erosion and pollution.

Restoring HCVMAs that have been cleared

In situations where HCVMAs have been cleared, either because an HCV assessment was not carried out prior to development or due to encroachment, steps should be taken to restore the natural vegetation for the following reasons:

- To comply with the RSPO P&C (5.2 & 7.3). This may form part of an HCV compensation strategy.
- To restore the ecological function of these areas.

Enhancing degraded areas of natural habitat

Areas of natural habitat that remain within oil palm landscapes will often be degraded by human and ecological edge effects. Reasons for enhancing these areas of habitat include:

- To comply with RSPO P&C 5.2.
- To increase the suitability of the habitat for wildlife and to support wildlife living in the area by planting appropriate food plants.
- To improve connectivity between remaining patches of natural habitat within the landscape.
- To provide resources for local people.
- To reduce soil erosion and pollution.

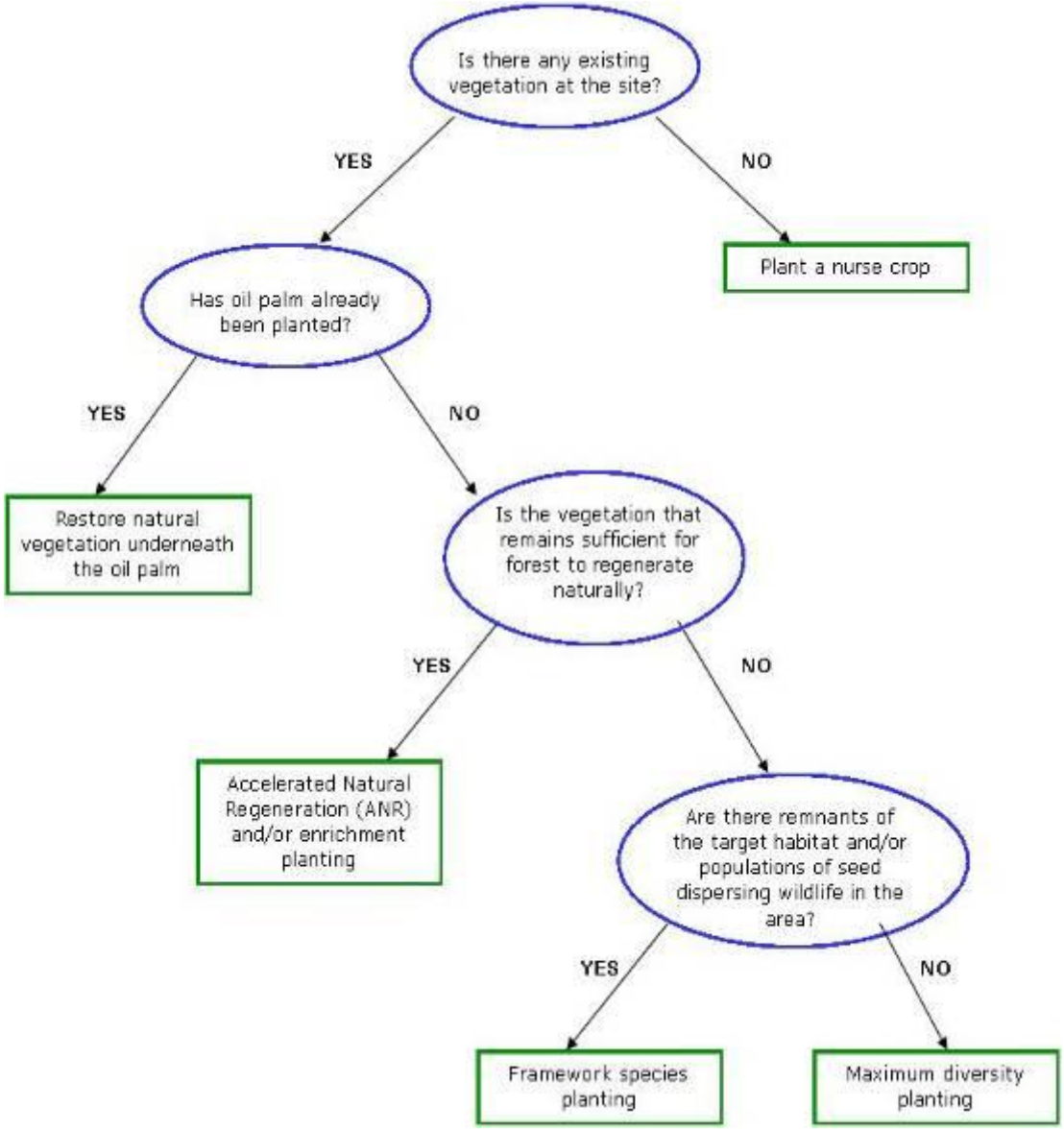
Strategies for restoring and enhancing natural habitats

The most appropriate strategy for restoring a particular site will vary depending on how degraded it is and the types of vegetation and wildlife that remain within the landscape. Factors to take into account when deciding on the best strategy for restoration include:

- **Remaining vegetation:** Do weeds, grasses, or vines that would out-compete tree seedlings dominant the site?
- **Level of soil erosion:** Is the soil still fertile enough to allow tree seedlings to grow?
- **Seed bank:** Are there enough mature trees, seedlings or seeds present in the soil at the site for natural regeneration to take place?
- **Remnants of the 'target' forest within the landscape:** Is coverage of good quality 'target' forest within dispersal distance of the site being restored sufficient to provide a source of seeds for natural regeneration?

- **Presence of seed dispersing animals:** Are the remaining populations of seed dispersing animals still capable of transporting seeds to the site being restored?

Figure 3: Decision tree for deciding when each strategy for forest restoration and enhancement is appropriate



Strategies:

Restoring natural vegetation in riparian zones or steep areas that have been planted with oil palm

- If the oil palms are well established, they should be left in place to avoid soil erosion that would be caused if they are cleared. However, they can be cut back to increase the light available to plants regenerating underneath. If the oil palms are still very young they should be removed.

- The use of pesticides and fertilisers should be stopped immediately. Ideally, these palms should not be harvested to avoid disturbing natural regeneration below the oil palms.
- Plant native, shade-tolerant tree species between the oil palms.
- Any oil palm seedlings that germinate from fallen fruits should be removed.

Accelerated Natural Regeneration (ANR)

This method aims to speed up the natural process of forest regeneration by removing weeds that may compete with regenerating seedlings, adding fertilisers to seedlings, mulching around existing trees and limiting disturbance, which would slow the regeneration process. This method should only be applied in areas where there is evidence that natural regeneration is already underway. This includes high densities of tree saplings, live tree stumps, and mature seed trees close to the site. It may be necessary to combine ANR with enrichment planting or framework forestry in order to restore the natural species composition of the target ecosystem.

Enrichment planting

This involves planting trees with the aim of either increasing the population density of a tree species that has an important ecological function (for example *Ficus* spp.) is particularly valuable to the local community, or to increase the diversity of tree species in the habitat being restored. Planting more fruiting and flowering species provides more food plants to support the wildlife in the area.

Framework species planting

The aim of this method is to plant a relatively limited variety of key species (perhaps 20–30 species) that will be capable of catalysing the natural process of forest regeneration in order to restore the target ecosystem so that further tree planting will not be necessary. For this to be effective, it is important that there are sources of seeds in the surrounding area, including mature seed trees and populations of seed dispersing wildlife. The species planted should be a mixture of pioneer, mid succession and mature forest species that have the following characteristics:

- Native to the area.
- High survival rate in disturbed areas.
- Rapid germination and growth.
- Produces flowers/fruit that attract seed dispersing wildlife at a young age, e.g. *Ficus* spp.

- Vigorous production of branches to create a dense canopy and leaf litter.

They will also depend on whether the area is steep or flood-prone, the type of soil and the objective of the restoration, e.g. to create suitable habitat for particular animals or to restore the forest structure.

Maximum diversity species planting

This method involves planting as many of the different species found in the target ecosystem as possible. This is a very expensive and labour intensive method but may be the only option for restoring the habitat to pre-disturbance conditions in areas where mature seed trees and seed dispersing wildlife in the surrounding area are not sufficient for regeneration to take place naturally.

Nurse tree crop planting

This method is necessary in areas where the soil has been heavily degraded and the majority of tree seedlings will be unable to grow. To overcome this, fast-growing pioneer species, such as leguminous or disturbance-tolerant trees, are planted to 'nurse' the soil back to health. A good example is *Macaranga* spp. Since these tree species will be removed from the final ecosystem, these can be exotic species as long as they are not invasive species. Once established, the nurse crop should be thinned and the area should be planted with either a framework of species or a maximum diversity of species, depending on the potential for natural regeneration to take place. The nurse tree crop should eventually be removed, taking care not to harm the understory vegetation it has helped to foster.

CASE STUDY: Forest restoration

What? The Sumatran Orangutan Society (SOS) and the Orangutan Information Centre (OIC) are carrying out forest restoration in areas of Gunung Leuser National Park that has been illegally converted to an oil palm monoculture.

Where? Gunung Leuser National Park, Langkat district, North Sumatra

Aims:

1. To restore areas of Gunung Leuser National Park that has been illegally planted with oil palm monoculture by planting indigenous tree species.
2. To work in close partnership with local stakeholders and encourage them to become stewards of the restoration programme.
3. To provide an on-going supply of seedlings to support restoration efforts in the Gunung Leuser National Park.
4. To monitor biodiversity levels in the restoration site.

How?

- A local farmers' group was established and provided with training in the creation of tree nurseries and forest restoration techniques.
- Tree nurseries were set up on community land surrounding the national park.
- Seeds are collected both from local community farmlands (with permission from the national park government authority) and from primary forests.

- Since 2007, 254 000 seedlings from 57 indigenous tree species have been cultivated and planted on degraded national park land.

- 6000 oil palms have been removed from 75 hectares of national park land.
- Restoration has been carried out in areas where the oil palm has been removed and in areas where the oil palm still remains. However, the intention is to remove all of the oil palms eventually, in order to restore the natural bio diverse rainforest.

- Only endemic tree species are planted at the restoration sites, which have been selected according to their suitability for the soil and climatic conditions. In the first stage of replanting, focus was on pioneer species such as *Macaranga* spp. to improve the soil condition and establish a young forest canopy. In the second year, slower growing, shade-dependent trees such as *Shorea* spp. and *Agathis* spp. were also planted. Fruiting pioneer species such as *Bridelia monoica* and *Macaranga gigantean* were also planted to attract birds and mammals. In addition to this, tree species that are attractive to orangutans for both food and nesting, were also planted.

How to carry out forest restoration or enhancement

Selecting species to use for restoration

The most appropriate species to use for each stage of forest restoration will depend on which of the strategies described above has been adopted. People living in and around the forest will often be a good source of information about the characteristics and functions of different tree species. Wherever possible, species with the following characteristics should be prioritised for inclusion in a forest restoration programme:

- **Native species:** Species native to the region known to grow under similar environmental conditions to that of the site being restored (i.e. elevation, level of rainfall, soil type).
- **Keystone species:** If the aim of restoration is to restore habitat for a specific species, the diet of this species should be taken into account when selecting the tree species to use for restoration. This includes tree species with fleshy fruits or nectar-rich flowers, which will attract a wide variety of wildlife, many of which will be pollinators and seed dispersers. Examples include native mango and *Ficus* spp.

- **Economically valuable species:** Identifying species will provide resources for people living in or around the forest, for example rattan and fruiting tree species can help improve the livelihoods of local communities and provide a greater incentive for them to support restoration efforts.

Sourcing seeds and seedlings

The best option to ensure a continuous supply of suitable seeds and seedlings for forest restoration may be to establish a nursery on the plantation. Some companies in Southeast Asia have combined this technique with the oil palm seedling nursery. The advantage of this is the initial cost of establishing the nursery will be lower. However, it may be preferable for the nursery to be established closer to the sites targeted for restoration and kept separate from the oil palm nursery to avoid any pest issues.

Alternatively, community nurseries have been established to provide additional income for households located near the plantation. Seedlings can be provided to communities by the company or with collaboration with nearby protected areas, community members can collect seedlings 'wildlings', from the buffer zones in a monitored and sustainable way. Companies can then purchase robust saplings from these household nurseries and further building relationships with the community, while promoting development and improving the HCVs of the concession.

Building an onsite nursery

The site for the nursery should have vehicle access and a reliable water supply. If possible, it should be located close to the sites that will be restored. The nursery should have the following features:

- ***Shaded area*** for seed preparation, sowing and germination. Shade can be created using netting.
- ***Enclosure made of wire mesh or fencing*** to protect seedlings from predation by rats and other wildlife.
- ***Raised beds or troughs of soil*** to plant very small seeds such as *Ficus* spp. The soil should be well aerated and 0.5–1 m deep.
- ***Open area*** where potted seedlings can be grown on and hardened ready for planting out.

Collecting seeds and seedlings

- Seeds should be collected from local areas near the target ecosystem, where environmental conditions are similar to the site that is being restored. This should be carried out in a sustainable manner, so as not to impact the remaining forested areas.
- Wherever possible, seeds and seedlings should be collected from the edges of forest habitats and along trails or roads so the seedlings would not incur a negative impact on natural forest regeneration.
- Determining the fruiting season for key species is useful so that seed collection can be carried out at the right time of year. Seeds can be collected from ripe fruits, ideally, by cutting them from branches. If this is not possible, they can be collected from the forest floor but it is important to avoid collecting fruits and seeds that are rotten or which show signs of fungal infection or predation by animals or insects.
- Seedlings or saplings growing close to the parent tree can also be collected and grown in the nursery.
- For each seed or seedling collected, the parent tree should be marked and a specimen of the leaf and fruit collected in order to easily identify the species. In cases where it is not possible to identify the name of the species accurately, the species can be assigned a number or the local name, instead. If possible, the GPS location of each tree should also be recorded.
- Seeds and seedlings of each species should be collected from as many different parent trees as possible to maximise genetic diversity. This will result in a healthier population, meaning this species will have a better chance of surviving.

Growing seeds and seedlings in the nursery

- **Germinating seeds**: The seeds of most rainforest tree species do not survive for very long after they mature and therefore, are difficult to store. Seeds are more likely to germinate if they are collected when they are mature and planted soon after they are collected. Some seeds may remain dormant (unable to germinate) for long periods of time or require specific environmental conditions to allow them to germinate. These species may be difficult or take a long time to germinate in the nursery.

- **Planting Seedlings:** Once the seeds have germinated, they can be planted into individual plastic sleeves. These should be filled with a mixture of 50% forest soil (if accessible without causing damage) and 50% organic matter, such as oil palm mulch or coconut husk. This helps to ensure that water, oxygen and nutrients reach the roots. Seeds should be planted so they are half exposed to try and prevent fungal attack.

- **Caring for seedlings:** Seedlings should be weeded and watered regularly, but the plastic sleeves should not become water logged. When very young, seedlings need to be watered every day, but this should be reduced in the 3–4 months prior to planting them out. During this period, seedlings should also be regularly exposed to direct sunlight, with a gradual reduction in netting so they don't get a shock when planted out. Seedlings should not be planted out until they are between 30 and 60 cm tall.

CASE STUDY: Seedling nurseries for forest enrichment

What? REA have established several seedling nurseries of fruit trees, rattan, ulin/ironwood (*Eusydirexylon zwagery*) and other timber trees, which REA regularly gives away to plantation workers and local farmers to encourage them to enrich the forest and create a more pleasant and productive environment.

Where? REA Kaltim, Hulu Belayan, East Kalimantan, Indonesia

Aims:

1. By encouraging plantation staff to plant a variety of fruit trees around their houses and the plantation school, this will improve the biodiversity and general environment of the estate emplacements.
2. If local people wish to plant the forest fruit trees in the Conservation Reserves, they are encouraged to make use of this valuable and sustainable resource. REA hopes this will increase the incentive for them to support and participate in the conservation of these reserves, particularly by avoiding slashing and burning areas for cultivation.
3. Enriching the Conservation Reserves with species of local/indigenous fruit trees supports higher densities of certain biodiversity in these forest areas. Conservation of existing fruit trees such as “bendang” palms (*Borassodendron* spp.) maintains food availability in the short term while allowing fruit trees to mature, and enrichment planting of durian (*Durio* spp.) and other species in the Conservation Reserves will provide longer term food resources for orangutans, gibbons, large frugivorous birds (such as hornbills and pigeons) and fruit bats who are important forest pollinators.

How?

- **Sourcing the seeds:** The staff at REA KON regularly carries out ‘Seed cleaning’, including rambutan (*Nephelium lappaceum*), nangka (*Artocarpus heterophyllus*) and in particular focusing on endemic species to Kalimantan). Seeds are also collected from trees in the forest such as ulin and jelmuk (*Irvingia malayana*). High-quality rattan seedlings have been purchased from Samarinda and distributed to local villagers. Seeds are germinated in polybags in a mixture of soil and old palm sludge for 6–12 months, depending on the species, until they are big enough to survive. They are then distributed. Watering is done by the gardener.

`

- **Distributing the seeds:** Staff and local people who visit or attend meetings/presentations on the estate are encouraged to visit the nursery and take some fruit tree seedlings home with them.

Resources needed:

- **Equipment:** Seeds (see above), polybags, soil and oil palm sludge
- **Labour:** Cooperation by REA KON staff and daily maintenance by the gardener.
- **Cost:** Approximate cost: USD $15,000

Planting out seedlings

- The optimal time for planting out seedlings is 4–6 weeks into the rainy season.
- Only vigorous, disease-free seedlings should be selected for planting.
- Prior to planting, the site being restored should be cleared of weeds and grasses that may limit the growth of the seedlings (not by spraying).
- Seedlings should be planted in holes of around 10–15 cm in diameter and 45 cm depth. These holes should be filled with a mixture of soil and organic fertiliser. Each seedling planted should be tagged to enable monitoring of their survival.
- Seedlings should be planted at least 1.5–3m apart, although this will vary depending on the density of existing seedlings and trees at the site being restored, the number of seedlings available for planting, and the area of the site being restored.
- The species to be planted in each location should be selected based on the environmental conditions, i.e. sunlight, soil type and quality and water availability.
- For the first year after planting, the areas where seedlings have been planted out should be weeded on a monthly basis to prevent them from being overgrown. In areas used by elephants, wild boars or deer, it may be necessary to erect electric fencing for the first two years to prevent the seedlings from being eaten, trampled or uprooted.

Monitoring the success of forest restoration

Monitoring the success of forest restoration is important to improve the efficiency and effectiveness of future restoration efforts. For example, monitoring the survival of seedlings of different species both in the nursery and once they have been planted out, can provide valuable information about which species germinate and survive best under different environmental conditions.

A very simple way of monitoring the progress of restoration efforts is to establish several locations from which photos are taken from the same angle every 6 months.

However, to determine whether or not the restoration effort is successful in the longer term it is necessary to monitor changes in the ecological attributes and functions that the restoration effort is aiming to restore or enhance (See Chapter 8).

Involving the local community in forest restoration

Involving people who live in and around the oil palm concession in forest restoration can provide local communities with an additional source of income and also help to create a greater incentive for them to support the restoration efforts, meaning it is likely to be more successful.

People who live in or around the forest often have a good knowledge of which tree species have particular characteristics and functions, so involving local communities in seed collection can be very beneficial for both parties.

Another way of involving local communities would be for the company to assist the local community to establish a seedling nursery, perhaps as part of their community development programme. The local community would be responsible for collecting the seeds and managing the nursery, although some technical assistance from the company or local NGOs may be required. The company would commit to purchasing the seedlings from the local community.

APPENDIX 2: Sample list of key HCV species in West and Central Africa

HCV species include all species listed in CITES Appendix 1 or 2, all species with IUCN status beyond Least Concern, and all species that are nationally protected by law. Note that the legal status of a species may vary from one country to another. You may contact local wildlife authorities or conservation NGOs for an exhaustive list of nationally protected species.

This table presents just a sample of potential HCV species in West and Central Africa for Critically Endangered (CR), Endangered (EN) and Vulnerable (VU) mammal, bird, reptile and amphibian species (except marine species), on the IUCN red list, for the 19 countries producing palm oil in West and Central Africa (Angola, Guinea Bissau, São Tomé e Príncipe, Guinea equatorial, Gambia, Ghana, Liberia, Nigeria, Sierra Leone, Benin, Cameroun, Côte d'Ivoire, Congo, R, Congo, R.D., Gabon, Guinée, République Centrafricaine, Sénégal, Togo).

Class	Species	Common names (Eng)	Common names (Fre)	Red List status	CITES	Population trend
AMPHIBIA	*Afrixalus lacteus*			EN		Decreasing
AMPHIBIA	*Afrixalus orophilus*	Two-lined leaf-gluing frog		VU		Decreasing
AMPHIBIA	*Alexteroon jynx*			CR		Decreasing
AMPHIBIA	*Amietophrynus djohongensis*			EN		Decreasing
AMPHIBIA	*Amietophrynus perreti*			VU		Unknown
AMPHIBIA	*Amietophrynus taiensis*	Tai toad		CR		Decreasing
AMPHIBIA	*Amietophrynus villiersi*			EN		Decreasing
AMPHIBIA	*Arlequinus krebsi*			EN		Decreasing
AMPHIBIA	*Arthroleptis crusculum*	Guinea screeching frog		EN		Decreasing
AMPHIBIA	*Arthroleptis krokosua*	Krokosua squeaking frog		EN		Unknown
AMPHIBIA	*Arthroleptis perreti*	Perret's squeaker frog		EN		Unknown
AMPHIBIA	*Astylosternus diadematus*	Victoria night frog		VU		Decreasing
AMPHIBIA	*Astylosternus fallax*			EN		Decreasing
AMPHIBIA	*Astylosternus laurenti*	Laurent's night frog		EN		Decreasing
AMPHIBIA	*Astylosternus nganhanus*	Nganha night frog		CR		Decreasing
AMPHIBIA	*Astylosternus perreti*			EN		Decreasing
AMPHIBIA	*Astylosternus ranoides*			EN		Decreasing

Class	Species	Common names (Eng)	Common names (Fre)	Red List status	CITES	Population trend
AMPHIBIA	*Astylosternus rheophilus*			VU		Decreasing
AMPHIBIA	*Astylosternus schioetzi*			EN		Decreasing
AMPHIBIA	*Callixalus pictus*			VU		Decreasing
AMPHIBIA	*Cardioglossa alsco*	Long-fingered frog		CR		Decreasing
AMPHIBIA	*Cardioglossa aureoli*	Freetown long-fingered frog		EN		Decreasing
AMPHIBIA	*Cardioglossa melanogaster*			EN		Decreasing
AMPHIBIA	*Cardioglossa oreas*			EN		Decreasing
AMPHIBIA	*Cardioglossa pulchra*	Black long-fingered frog		EN		Decreasing
AMPHIBIA	*Cardioglossa schioetzi*	Acha Tugi long-fingered frog		EN		Decreasing
AMPHIBIA	*Cardioglossa trifasciata*			CR		Decreasing
AMPHIBIA	*Cardioglossa venusta*	Highland long-fingered frog		EN		Decreasing
AMPHIBIA	*Conraua alleni*	Allen's slippery frog		VU		Decreasing
AMPHIBIA	*Conraua derooi*	Togo slippery frog		CR		Decreasing
AMPHIBIA	*Conraua goliath*	Goliath frog	Grenouille goliath	EN		Decreasing
AMPHIBIA	*Conraua robusta*	Cameroon slippery frog		VU		Decreasing
AMPHIBIA	*Didynamipus sjostedti*	Four-digit toad		EN		Decreasing
AMPHIBIA	*Hylarana asperrima*			EN		Decreasing
AMPHIBIA	*Hylarana longipes*			VU		Decreasing
AMPHIBIA	*Hylarana occidentalis*			EN		Decreasing
AMPHIBIA	*Hyperolius bobirensis*	Bobiri reed frog		EN		Decreasing
AMPHIBIA	*Hyperolius castaneus*	Montane reed frog		VU		Decreasing
AMPHIBIA	*Hyperolius chrysogaster*			VU		Decreasing
AMPHIBIA	*Hyperolius dintelmanni*			EN		Decreasing
AMPHIBIA	*Hyperolius discodactylus*	Albertine rift reed frog		VU		Decreasing
AMPHIBIA	*Hyperolius endjami*			VU		Decreasing

Class	Species	Common names (Eng)	Common names (Fre)	Red List status	CITES	Population trend
AMPHIBIA	*Hyperolius frontalis*	White-snouted reed frog		VU		Decreasing
AMPHIBIA	*Hyperolius laurenti*	Schiotz's reed frog		VU		Decreasing
AMPHIBIA	*Hyperolius leleupi*			EN		Decreasing
AMPHIBIA	*Hyperolius leucotaenius*			EN		Decreasing
AMPHIBIA	*Hyperolius nienokouensis*			EN		Decreasing
AMPHIBIA	*Hyperolius nimbae*	Mount Nimba reed frog		EN		Decreasing
AMPHIBIA	*Hyperolius polystictus*			VU		Unknown
AMPHIBIA	*Hyperolius riggenbachi*	Riggenbach’s reed frog		VU		Decreasing
AMPHIBIA	*Hyperolius thomensis*	São Tomé giant treefrog		EN		Decreasing
AMPHIBIA	*Hyperolius torrentis*	Ukami reed frog		EN		Decreasing
AMPHIBIA	*Hyperolius viridigulosus*	Stream reed frog		VU		Decreasing
AMPHIBIA	*Kassina arboricola*	Ivory Coast running frog		VU		Decreasing
AMPHIBIA	*Kassina lamottei*	Rainforest running frog		VU		Decreasing
AMPHIBIA	*Leptodactylodon albiventris*	Whitebelly egg frog		VU		Decreasing
AMPHIBIA	*Leptodactylodon axillaris*			CR		Unknown
AMPHIBIA	*Leptodactylodon bicolor*	Mountain egg frog		VU		Decreasing
AMPHIBIA	*Leptodactylodon boulengeri*	Boulenger's egg frog		VU		Decreasing
AMPHIBIA	*Leptodactylodon bueanus*			VU		Stable
AMPHIBIA	*Leptodactylodon erythrogaster*			CR		Decreasing
AMPHIBIA	*Leptodactylodon mertensi*	Mertens' egg frog		EN		Unknown
AMPHIBIA	*Leptodactylodon ornatus*	Ornate egg frog		EN		Decreasing
AMPHIBIA	*Leptodactylodon perreti*			EN		Decreasing
AMPHIBIA	*Leptodactylodon polyacanthus*			VU		Decreasing

Class	Species	Common names (Eng)	Common names (Fre)	Red List status	CITES	Population trend
AMPHIBIA	*Leptodactylodon stevarti*			EN		Decreasing
AMPHIBIA	*Leptodactylodon ventrimarmoratus*			VU		Decreasing
AMPHIBIA	*Leptodactylodon wildi*			EN		Decreasing
AMPHIBIA	*Leptopelis karissimbensis*			EN		Decreasing
AMPHIBIA	*Leptopelis palmatus*			VU		Stable
AMPHIBIA	*Morerella cyanophthalma*			VU		Unknown
AMPHIBIA	*Nimbaphrynoides liberiensis*			CR	Appendix I	Decreasing
AMPHIBIA	*Nimbaphrynoides occidentalis*	Western Nimba toad		CR	Appendix I	Decreasing
AMPHIBIA	*Petropedetes palmipes*	Efulen water frog		EN		Decreasing
AMPHIBIA	*Petropedetes perreti*	Perret's water frog		EN		Decreasing
AMPHIBIA	*Phrynobatrachus acutirostris*			VU		Decreasing
AMPHIBIA	*Phrynobatrachus annulatus*	Ringed river frog		EN		Decreasing
AMPHIBIA	*Phrynobatrachus bequaerti*			VU		Decreasing
AMPHIBIA	*Phrynobatrachus chukuchuku*	Spiny puddle frog		CR		Unknown
AMPHIBIA	*Phrynobatrachus cricogaster*	Nkongsamba river frog		VU		Decreasing
AMPHIBIA	*Phrynobatrachus ghanensis*	Ghana river frog		EN		Decreasing
AMPHIBIA	*Phrynobatrachus intermedius*			CR		Unknown
AMPHIBIA	*Phrynobatrachus steindachneri*			VU		Decreasing
AMPHIBIA	*Phrynobatrachus*			VU		Decreasing

Class	Species	Common names (Eng)	Common names (Fre)	Red List status	CITES	Population trend
	versicolor					
AMPHIBIA	*Phrynobatrachus villiersi*	Yapo river frog		VU		Decreasing
AMPHIBIA	*Ptychadena newtoni*			EN		Decreasing
AMPHIBIA	*Werneria bambutensis*			EN		Decreasing
AMPHIBIA	*Werneria iboundji*			CR		Decreasing
AMPHIBIA	*Werneria mertensiana*	Mertens' smalltongue toad		EN		Decreasing
AMPHIBIA	*Werneria preussi*			EN		Unknown
AMPHIBIA	*Werneria submontana*			EN		Decreasing
AMPHIBIA	*Werneria tandyi*			EN		Decreasing
AMPHIBIA	*Wolterstorffina chirioi*			CR		Decreasing
AMPHIBIA	*Wolterstorffina mirei*			EN		Decreasing
AMPHIBIA	*Wolterstorffina parvipalmata*	Cameroon Wolterstorff toad		VU		Decreasing
AMPHIBIA	*Xenopus itombwensis*	Itombwe Massif clawed frog		CR		Stable
AMPHIBIA	*Xenopus longipes*	Lake Oku clawed frog		CR		Stable
AVES	*Acrocephalus paludicola*	Aquatic warbler	Phragmite aquatique	VU		Decreasing
AVES	*Afropavo congensis*	Congo peafowl	Paon du Congo	VU		Decreasing
AVES	*Agelastes meleagrides*	White-breasted guineafowl	Pintade à poitrine blanche	VU		Decreasing
AVES	*Amaurocichla bocagei*	São Tomé short-tail	Fauvette de São Tomé	VU		Stable
AVES	*Ardeola idae*	Madagascar pond-heron	Héron crabier blanc	EN		Decreasing
AVES	*Balaeniceps rex*	Shoebill	Bec-en-sabot	VU	Appendix II	Decreasing
AVES	*Balearica pavonina*	Black crowned-crane	Grue couronnée	VU	Appendix II	Decreasing
AVES	*Balearica regulorum*	Grey crowned-crane	Grue royale	EN	Appendix II	Decreasing
AVES	*Bostrychia bocagei*	Dwarf olive ibis	Ibis de São Tomé	CR		Decreasing
AVES	*Bradypterus graueri*	Grauer's swamp-warbler	Fauvette de Grauer	EN		Decreasing
AVES	*Bucorvus leadbeateri*	Southern ground-hornbill	Grand calao terrestre	VU		Decreasing

Class	Species	Common names (Eng)	Common names (Fre)	Red List status	CITES	Population trend
AVES	*Bugeranus carunculatus*	Wattled crane	Grue caronculée	VU	Appendix II	Decreasing
AVES	*Bycanistes cylindricus*	Brown-cheeked hornbill	Calao à joues brunes	VU		Decreasing
AVES	*Campephaga lobata*	Western wattled cuckooshrike	Echenilleur à barbillans	VU		Decreasing
AVES	*Caprimulgus prigoginei*	Itombwe nightjar	Engoulevent de Prigogine	EN		Decreasing
AVES	*Ceratogymna elata*	Yellow-casqued hornbill	Calao à casque jaune	VU		Decreasing
AVES	*Chlorocichla prigoginei*	Prigogine's greenbul	Bulbul de Prigogine	EN		Decreasing
AVES	*Chloropeta gracilirostris*	Papyrus yellow warbler	Fauvette jaune aquatique	VU		Decreasing
AVES	*Circaetus beaudouini*	Beaudouin's snake-eagle	Circaète de Beaudouin	VU	Appendix II	Decreasing
AVES	*Columba thomensis*	Maroon pigeon	Pigeon de São Tomé	EN		Decreasing
AVES	*Cossypha heinrichi*	White-headed robin-chat	Cossyphe à tête blanche d'Angola	VU		Decreasing
AVES	*Criniger olivaceus*	Yellow-bearded greenbul	Bulbul à barbe jaune	VU		Decreasing
AVES	*Cryptospiza shelleyi*	Shelley's crimson-wing	Bengali de Shelley	VU		Decreasing
AVES	*Eremomela turneri*	Turner's eremomela	Erémomèle de Turner	EN		Decreasing
AVES	*Estrilda poliopareia*	Anambra waxbill	Astrild du Niger	VU		Stable
AVES	*Francolinus camerunensis*	Mount Cameroon francolin	Francolin du mont Cameroun	EN		Decreasing
AVES	*Francolinus nahani*	Nahan's francolin	Francolin de Nahan	EN		Decreasing
AVES	*Geronticus eremita*	Northern bald ibis	Ibis chauve	CR	Appendix I	Decreasing
AVES	*Glaucidium albertinum*	Albertine owlet	Chevêchette du Graben	VU	Appendix II	Decreasing
AVES	*Gyps africanus*	White-backed vulture	Vautoir africain	EN	Appendix II	Decreasing
AVES	*Gyps rueppellii*	Rueppell's vulture	Vautour de Rüppell	EN	Appendix II	Decreasing
AVES	*Hirundo atrocaerulea*	Blue swallow	Hirondelle bleue	VU		Decreasing
AVES	*Kupeornis gilberti*	White-throated mountain-babbler	Timalie à gorge blanche	EN		Decreasing
AVES	*Lanius newtoni*	São Tomé fiscal shrike	Pie-grièche de São Tomé	CR		Decreasing

Class	Species	Common names (Eng)	Common names (Fre)	Red List status	CITES	Population trend
AVES	*Malaconotus gladiator*	Green-breasted bush-shrike	Gladiateur à poitrine verte	VU		Decreasing
AVES	*Malimbus ballmanni*	Gola malimbe	Malimbe de Gola	EN		Decreasing
AVES	*Malimbus ibadanensis*	Ibadan malimbe	Malimbe d'Ibadan	EN		Decreasing
AVES	*Marmaronetta angustirostris*	Marbled teal	Sarcelle marbrée	VU		Decreasing
AVES	*Melaenornis annamarulae*	Nimba flycatcher	Gobemouche noir du Nimba	VU		Decreasing
AVES	*Muscicapa lendu*	Chapin's flycatcher	Gobemouche du Lendu	VU		Decreasing
AVES	*Necrosyrtes monachus*	Hooded vulture	Percnoptère brun	EN	Appendix II	Decreasing
AVES	*Nectarinia rockefelleri*	Rockefeller's sunbird	Souimanga de Rockefeller	VU		Stable
AVES	*Nectarinia thomensis*	Giant sunbird	Grand Souimanga de São Tomé	VU		Stable
AVES	*Neophron percnopterus*	Egyptian eagle	Vautour percnoptère	EN	Appendix II	Decreasing
AVES	*Neospiza concolor*	São Tomé grosbeak	Grosbec de São Tomé	CR		Decreasing
AVES	*Oriolus crassirostris*	São Tomé oriole	Loriot de São Tomé	VU		Stable
AVES	*Otus hartlaubi*	São Tomé scops-owl	Petit-duc de São Tomé	VU	Appendix II	Stable
AVES	*Phodilus prigoginei*	Congo bay-owl	Phodile de Prigogine	EN	Appendix II	Decreasing
AVES	*Phyllastrephus leucolepis*	Liberian greenbul	Bulbul ictérin tacheté	CR		Decreasing
AVES	*Picathartes gymnocephalus*	White-necked picathartes	Picatharte de Guinée	VU	Appendix I	Decreasing
AVES	*Picathartes oreas*	Grey-necked picathartes	Picatharte du Cameroun	VU	Appendix I	Decreasing
AVES	*Platysteira laticincta*	Banded wattle-eye		EN		Decreasing
AVES	*Ploceus aureonucha*	Golden-naped weaver	Tisserin à nuque d'or	EN		Decreasing
AVES	*Ploceus bannermani*	Bannerman's weaver	Tisserin de Bannerman	VU		Decreasing
AVES	*Ploceus batesi*	Bates's weaver	Tisserin de Bates	EN		Decreasing
AVES	*Ploceus flavipes*	Yellow-legged weaver	Tisserin à pieds jaunes	VU		Decreasing
AVES	*Ploceus subpersonatus*	Loango weaver	Tisserin de Cabinda	VU		Decreasing

Class	Species	Common names (Eng)	Common names (Fre)	Red List status	CITES	Population trend
AVES	*Prinia leontica*	White-eyed prinia	Prinia de Sierra Leone	VU		Decreasing
AVES	*Prionops alberti*	Yellow-crested helmet-shrike	Bagadais du Roi Albert	VU		Decreasing
AVES	*Pseudocalyptomena graueri*	African Green broadbill	Eurylaime de Grauer	VU		Decreasing
AVES	*Psittacus erithacus*	Grey parrot	Perroquet jaco	VU	Appendix II	Decreasing
AVES	*Psittacus timneh*	Timneh parrot	Gris d'Afrique	VU	Appendix II	Decreasing
AVES	*Sagittarius serpentarius*	Secretarybird	Secrétaire	VU	Appendix II	Decreasing
AVES	*Schoutedenapus schoutedeni*	Schouteden's swift	Martinet de Schouteden	VU		Decreasing
AVES	*Scotopelia ussheri*	Rufous fishing-owl	Chouette-pêcheuse rousse	VU	Appendix II	Decreasing
AVES	*Speirops brunneus*	Fernando Po speirops	Speirops de Fernando Po	VU		Stable
AVES	*Speirops melanocephalus*	Mount Cameroon speirops	Zostérops du Cameroun	VU		Stable
AVES	*Tauraco bannermani*	Bannerman's turaco	Touraco doré	EN	Appendix II	Decreasing
AVES	*Telophorus kupeensis*	Mount Kupé bush-shrike	Gladiateur du Mont Kupé	EN		Decreasing
AVES	*Torgos tracheliotos*	Lappet-faced vulture	Vautour oricou	VU	Appendix II	Decreasing
AVES	*Treron sanctithomae*	São Tomé green-pigeon	Colombar de São Tomé	VU		Decreasing
AVES	*Trigonoceps occipitalis*	White-headed vulture	Vautour à tête blanche	VU	Appendix II	Decreasing
AVES	*Turdus xanthorhynchus*	Príncipe thrush	Merle de Principé	CR		Decreasing
AVES	*Vanellus gregarius*	Sociable lapwing	Vanneau sociable	CR		Decreasing
AVES	*Zoothera guttata*	Spotted ground-thrush	Grive terrestre de Fischer	EN		Decreasing
AVES	*Zosterops ficedulinus*	São Tomé white-eye	Oiseau-lunettes de Principé	VU		Stable
AVES	*Zosterops griseovirescens*	Annobón white-eye	Oiseau-lunettes de l'île Annobon	VU		Stable
MAMMALIA	*Acinonyx jubatus*	Cheetah	Guépard	VU	Appendix I	Decreasing
MAMMALIA	*Cephalophus jentinki*	Jentink's duiker	Céphalophe de Jentink	EN	Appendix I	Decreasing
MAMMALIA	*Cephalophus zebra*	Zebra duiker	Céphalophe zèbré	VU	Appendix II	Decreasing

Class	Species	Common names (Eng)	Common names (Fre)	Red List status	CITES	Population trend
MAMMALIA	*Cercocebus atys*	Sooty mangabey	Mangabey enfumé	VU	Appendix II	Decreasing
MAMMALIA	*Cercocebus torquatus*	White-collared mangabey	Mangabey couronné	VU	Appendix II	Decreasing
MAMMALIA	*Cercopithecus diana*	Diana monkey	Cercopithèque Diane	VU	Appendix I	Decreasing
MAMMALIA	*Cercopithecus dryas*	Dryad monkey	Cercopithèque dryas	CR	Appendix II	Unknown
MAMMALIA	*Cercopithecus erythrogaster*	White-throated monkey	Cercopithèque à ventre roux	VU	Appendix II	Decreasing
MAMMALIA	*Cercopithecus erythrotis*	Red-eared monkey	Moustac à oreilles rouges	VU	Appendix II	Decreasing
MAMMALIA	*Cercopithecus hamlyni*	Owl-faced monkey	Cercopithèque d'Hamlyn	VU	Appendix II	Decreasing
MAMMALIA	*Cercopithecus lhoesti*	L'Hoest's monkey	Cercopithèque de l'Hoest	VU	Appendix II	Decreasing
MAMMALIA	*Cercopithecus preussi*	Preuss's monkey	Cercopithèque de Preuss	EN	Appendix II	Decreasing
MAMMALIA	*Cercopithecus sclateri*	Sclater's monkey		VU	Appendix II	Decreasing
MAMMALIA	*Cercopithecus solatus*	Sun-tailed monkey	Cercopithèque à queue de soleil	VU	Appendix II	Unknown
MAMMALIA	*Choeropsis liberiensis*	Pygmy hippopotamus	Hippopotame nain	EN	Appendix II	Decreasing
MAMMALIA	*Colobus polykomos*	King colobus	Colobe à longs poils	VU	Appendix II	Unknown
MAMMALIA	*Colobus satanas*	Black colobus	Colobe satan	VU	Appendix II	Decreasing
MAMMALIA	*Colobus vellerosus*	White-thighed colobus	Colobe magistrat	VU	Appendix II	Unknown
MAMMALIA	*Crocidura eisentrauti*	Eisentraut's shrew		VU		Stable
MAMMALIA	*Crocidura kivuana*	Kivu shrew		VU		Unknown
MAMMALIA	*Crocidura lanosa*	Kivu long-haired shrew		EN		Decreasing
MAMMALIA	*Crocidura manengubae*	Manenguba shrew		VU		Decreasing
MAMMALIA	*Crocidura picea*	Cameroonian shrew		EN		Decreasing
MAMMALIA	*Crocidura stenocephala*	Narrow-headed shrew		EN		Decreasing
MAMMALIA	*Crocidura tarella*	Tarella shrew		EN		Decreasing
MAMMALIA	*Crocidura thomensis*	São Tomé shrew		EN		Decreasing
MAMMALIA	*Crocidura wimmeri*	Wimmer's shrew		CR		Unknown

Class	Species	Common names (Eng)	Common names (Fre)	Red List status	CITES	Population trend
MAMMALIA	*Delanymys brooksi*	Delany's swamp mouse		VU		Decreasing
MAMMALIA	*Dendromus kahuziensis*	Mount Kahuzi African climbing mouse		CR		Decreasing
MAMMALIA	*Dendromus oreas*	Cameroon climbing mouse		VU		Unknown
MAMMALIA	*Diceros bicornis*	Black rhinoceros	Rhinocéros noir	CR	Appendix I	Increasing
MAMMALIA	*Eudorcas rufifrons*	Red-fronted gazelle	Gazelle à front roux	VU		Decreasing
MAMMALIA	*Felis nigripes*	Black-footed cat	Chat à pieds noirs	VU	Appendix I	Decreasing
MAMMALIA	*Gazella dorcas*	Dorcas gazelle	Gazelle dorcas	VU	Appendix III (Algeria & Tunisia)	Decreasing
MAMMALIA	*Genetta cristata*	Crested genet		VU		Decreasing
MAMMALIA	*Genetta johnstoni*	Johnston's genet		VU		Decreasing
MAMMALIA	*Gorilla beringei*	Eastern gorilla	Gorille de l'est	EN	Appendix I	Decreasing
MAMMALIA	*Gorilla gorilla*	Western gorilla	Gorille de l'ouest	CR	Appendix I	Decreasing
MAMMALIA	*Hippopotamus amphibius*	Hippopotamus	Hippopotame	VU	Appendix II	Decreasing
MAMMALIA	*Hipposideros curtus*	Short-tailed roundleaf bat		VU		Decreasing
MAMMALIA	*Hipposideros lamottei*	Lamotte's roundleaf bat		CR		Decreasing
MAMMALIA	*Hipposideros marisae*	Aellen's roundleaf bat		VU		Decreasing
MAMMALIA	*Hybomys badius*	Eisentraut's striped mouse		EN		Decreasing
MAMMALIA	*Hybomys basilii*	Father Basilio's striped mouse		EN		Unknown
MAMMALIA	*Hybomys lunaris*	Moon striped mouse		VU		Stable
MAMMALIA	*Hylomyscus baeri*	Baer's wood mouse		EN		Decreasing
MAMMALIA	*Hylomyscus grandis*	Mount Oku hylomyscus		CR		Decreasing
MAMMALIA	*Lamottemys okuensis*	Mount Oku rat	Rat du mont Oku	EN		Decreasing
MAMMALIA	*Lemniscomys mittendorfi*	Mittendorf's striped grass mouse		VU		Stable
MAMMALIA	*Liberiictis kuhni*	Liberian mongoose	Mangouste du Libéria	VU		Decreasing

Class	Species	Common names (Eng)	Common names (Fre)	Red List status	CITES	Population trend
MAMMALIA	*Lophuromys dieterleni*	Dieterlen's brush-furred mouse		EN		Decreasing
MAMMALIA	*Lophuromys eisentrauti*			EN		Decreasing
MAMMALIA	*Lophuromys medicaudatus*	Medium-tailed brush-furred rat		VU		Decreasing
MAMMALIA	*Lophuromys rahmi*	Rahm's brush-furred rat		EN		Unknown
MAMMALIA	*Loxodonta africana*	African elephant (sub-species: *Loxondata cyclotis*, Forest elephants)	Éléphant d'Afrique (sous-espèce: Éléphant de forêt d'Afrique)	VU	Appendix I (Except the populations of Bostwana, Namibia, South Africa and Zimbabwe which are included in Appendix II)	Increasing
MAMMALIA	*Lycaon pictus*	African wild dog	Lycaon	EN		Decreasing
MAMMALIA	*Mandrillus leucophaeus*	Drill	Drill	EN	Appendix I	Unknown
MAMMALIA	*Mandrillus sphinx*	Mandrill	Mandrill	VU	Appendix I	Unknown
MAMMALIA	*Micropotamogale lamottei*	Nimba otter shrew	Micropotamogale de Lamotte	EN		Decreasing
MAMMALIA	*Myonycteris brachycephala*	São Tomé collared fruit bat		EN		Decreasing
MAMMALIA	*Myosorex blarina*	Montane mouse shrew		EN		Decreasing
MAMMALIA	*Myosorex eisentrauti*	Eisentraut's mouse shrew	Musaraigne d'Eisentraut	CR		Decreasing
MAMMALIA	*Myosorex okuensis*	Oku mouse shrew		EN		Decreasing
MAMMALIA	*Myosorex rumpii*	Rumpi mouse shrew		EN		Decreasing
MAMMALIA	*Nanger dama*	Dama gazelle	Gazelle Dama	CR	Appendix I	Decreasing
MAMMALIA	*Otomys burtoni*	Burtons Vlei rat		EN		Decreasing
MAMMALIA	*Otomys occidentalis*	Western Vlei rat		VU		Decreasing
MAMMALIA	*Pan paniscus*	Bonobo	Bonobo	EN	Appendix I	Decreasing
MAMMALIA	*Pan troglodytes*	Chimpanzee	Chimpanzé	EN	Appendix I	Decreasing

Class	Species	Common names (Eng)	Common names (Fre)	Red List status	CITES	Population trend
MAMMALIA	*Panthera leo*	African lion	Lion d'Afrique	VU	Appendix II	Decreasing
MAMMALIA	*Praomys hartwigi*	Hartwig's soft-furred mouse		EN		Decreasing
MAMMALIA	*Praomys morio*	Cameroon soft-furred mouse		EN		Decreasing
MAMMALIA	*Praomys obscurus*			EN		Decreasing
MAMMALIA	*Procolobus badius*	West African red colobus	Colobe bai	EN	Appendix II	Decreasing
MAMMALIA	*Procolobus pennantii*	Pennant's red colobus	Colobe bai de Pennant	CR	Appendix II	Decreasing
MAMMALIA	*Procolobus preussi*	Preuss's red colobus	Colobe roux du Cameroun	CR	Appendix II	Decreasing
MAMMALIA	*Rhinolophus guineensis*	Guinean horseshoe bat		VU		Unknown
MAMMALIA	*Rhinolophus maclaudi*	Maclaud's horseshoe bat		EN		Decreasing
MAMMALIA	*Rhinolophus ruwenzorii*	Ruwenzori horseshoe bat		VU		Decreasing
MAMMALIA	*Rhinolophus ziama*	Ziama horseshoe bat		EN		Decreasing
MAMMALIA	*Ruwenzorisorex suncoides*	Ruwenzori shrew		VU		Unknown
MAMMALIA	*Sylvisorex camerunensis*			VU		Decreasing
MAMMALIA	*Sylvisorex isabellae*	Bioko forest shrew		EN		Decreasing
MAMMALIA	*Sylvisorex lunaris*	Moon forest shrew		VU		Decreasing
MAMMALIA	*Sylvisorex morio*	Mount Cameroon forest shrew		EN		Decreasing
MAMMALIA	*Tadarida tomensis*	São Tomé free-tailed bat		EN		Decreasing
MAMMALIA	*Thamnomys kempi*	Kemp's thicket rat		VU		Unknown
MAMMALIA	*Thamnomys venustus*	Charming thicket rat		VU		Decreasing
MAMMALIA	*Trichechus senegalensis*	West African manatee	Lamantin d'Afrique de l'ouest	VU	Appendix I	Unknown
REPTILIA	*Afroablepharus africana*	Guinea lidless skink		VU		Unknown
REPTILIA	*Afroablepharus annobonensis*	Annobon lidless skink		CR		Unknown
REPTILIA	*Centrochelys sulcata*	African spurred tortoise	Tortue sillonnée	VU	Appendix II	Needs updating

Class	Species	Common names (Eng)	Common names (Fre)	Red List status	CITES	Population trend
REPTILIA	*Cnemaspis occidentalis*	Western gecko		EN		Unknown
REPTILIA	*Cynisca gansi*			CR		Unknown
REPTILIA	*Cynisca kigomensis*			CR		Unknown
REPTILIA	*Cynisca leonina*	Los Archipelago worm lizard		VU		Unknown
REPTILIA	*Cynisca nigeriensis*			VU		Unknown
REPTILIA	*Cynisca oligopholis*	Cassine river worm lizard		EN		Unknown
REPTILIA	*Hemidactylus kundaensis*			CR		Unknown
REPTILIA	*Kinixys homeana*	Home's hinge-back tortoise	Kinixys de Home	VU	Appendix II	Decreasing
REPTILIA	*Leptosiaphos meleagris*	Ruwenzori four toed Skink		VU		Unknown
REPTILIA	*Leptosiaphos pauliani*	Five-toed skink		EN		Unknown
REPTILIA	*Osteolaemus tetraspis*	African dwarf crocodile	Crocodile nain Africain	VU	Appendix I	Needs updating

Useful references and resources
The IUCN red list of Threatened species 2013.1 *http://www.iucnredlist.org/*
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), species database *http://www.cites.org/eng/resources/species.html*