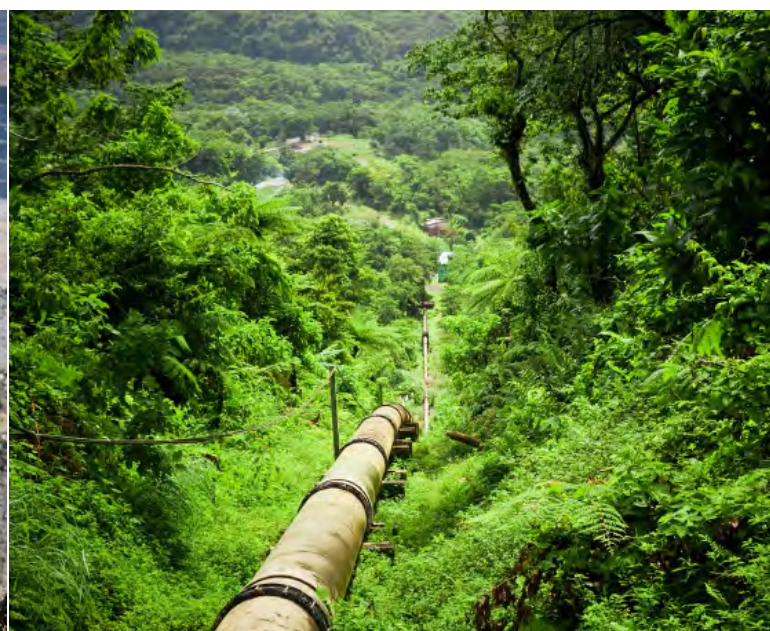


AUDIT CHECKLIST FOR AN OPERATING FACILITY EMERGING INFECTIOUS DISEASES

June, 2012



Emerging Pandemic Threats Program

PREDICT • RESPOND • PREVENT • IDENTIFY



Audit Checklist for an Operating Facility - Emerging Infectious Diseases

This package of materials is designed to help Environment, Health, and Safety (EHS) Officers of an operating facility to assess the possible areas where their facility may have vulnerabilities with respect to the risks of emerging infectious diseases. This package begins with a brief description of the dynamics of infectious disease emergence and the potential linkages and impacts to extractive industries. Following the background section is a checklist for an EHS officer to use to identify possible areas of vulnerability. Following the checklist are control measures that could be used if the facility does not have control measures in place. This is not a comprehensive list, but provides representative measures. The facility should consult with a local expert to address potential vulnerabilities and the appropriate site-specific control measures.

Emerging Infectious Diseases and Operating Extractive Industries

Nearly three-quarters of emerging infectious diseases originate from wildlife. Three wild animal groups, which comprise approximately 70 percent of mammal species, are considered most likely to spread new infections to people: bats (Corona virus responsible for SARS and Marburg, Nipah and Rabies viruses), rodents (Lassa, hanta, and monkeypox viruses) and non-human primates (Ebola and yellow fever viruses). People contract these diseases by inhalation of aerosolized contaminated feces and urine, through direct contact via scratches, bites, and bodily fluids—such as blood and saliva—that can occur during hunting and food preparation, by ingesting contaminated food, water, or undercooked meat. Disease emergence is dynamic, and is influenced by ecological, biological, and social factors. Certain areas of the world have been identified as “hot spots” of disease emergence. These are illustrated in Figure 1.

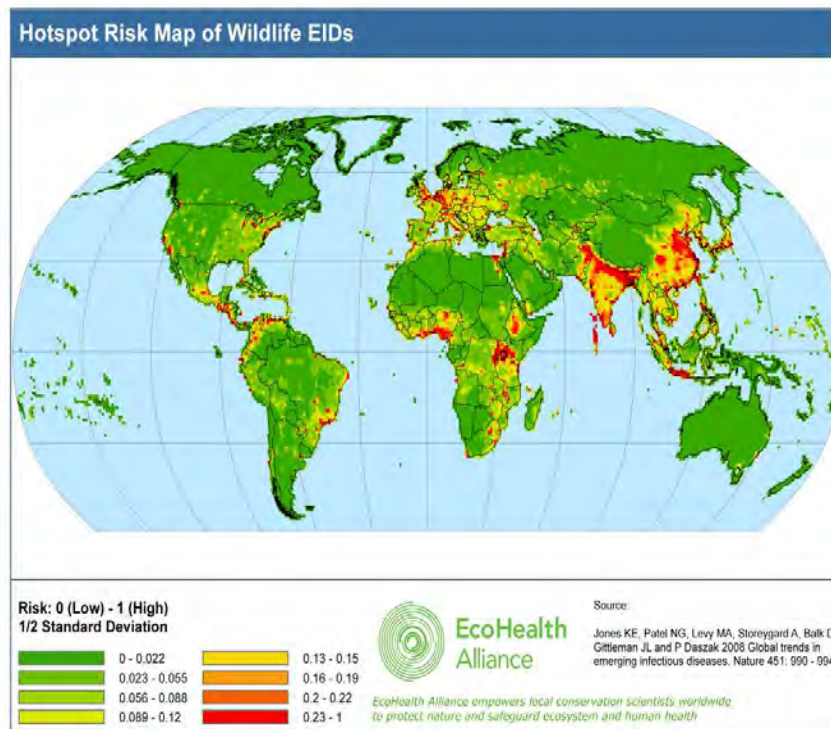


Figure 1: Hotspot Risk Map of Wildlife EIDs

Industrial activities in these areas that can contribute to disease emergence include, but are not limited to:

- Deforestation
- Road and corridor development
- Construction and operation of work camps and other facilities
- Expansion of surrounding local communities and agriculture
- Project-induced migration that strains local community infrastructure (e.g., health care, potable water, sanitation, and vector control)

The above activities bring people to previously wild areas and can fragment wildlife habitat and reduce biodiversity, which can alter the distribution and abundance of wildlife and their associated pathogens, and amplify the risk of pathogen “spillover” into new populations. Increasing contact between people, domestic animal (e.g. livestock), and wildlife populations increases the likelihood of spillover and disease transmission between species.

All animal species can carry zoonotic diseases. As habitats fragment and people enter previously undeveloped areas, some wildlife species will seek alternate food and shelter resources, bringing them into closer contact with people. For example, some wildlife populations may grow because they take advantage of the new food sources and habitats

created at construction camps, canteens, and villages. As a result, human-animal contact may increase, raising the potential of human exposure to disease. Other animals may become a nuisance or pest because they raid crops in fields that border their habitat, invade onsite living quarters or nearby homes, become violent, or eat infected animals. Changing land use patterns can also affect species and pathogen dynamics, as pathogens like viruses and bacteria infect and become adapted to new hosts. When combined with increased contact between wildlife and humans, these changing dynamics can make it easier for new viruses to emerge.

As more people populate a previously undeveloped area, hunting pressure often increases. Agriculture may be introduced or intensified. These factors lead to increased potential for interaction between wildlife and people. These interactions may also be exacerbated by growing human populations that can stress local health care, water, food, and waste management infrastructures. In turn, stressed systems are more likely to break down, creating ideal conditions for increased disease transmission and emergence.

Effects of industrial activity

Table 1 summarizes some industry activities that can increase or exacerbate the potential of zoonotic disease transmission.

Industry Activity	Effect	Emerging Infectious Disease Issues
Construction/Operation of facilities, work camps, roads, pipelines, railroads, etc.	<ul style="list-style-type: none"> • Modifies existing wildlife habitat. • Wildlife can search for new food and shelter sources in work camps and any new settlements. 	<ul style="list-style-type: none"> • Increases human-wildlife contact.
Roadways; transportation routes; transmission lines	<ul style="list-style-type: none"> • Modifies existing wildlife habitat. • Increases access to remote undeveloped areas. • Increases bushmeat hunting. 	<ul style="list-style-type: none"> • Increases human-wildlife contact. • Potential consumption of bushmeat.
Infrastructure Facilities (including on-site housing catering facilities, housing & laundry, sewage treatment plants (STP), surface-water runoff control, dams, and containment facilities)	<ul style="list-style-type: none"> • Open sewage, water, and food can attract wildlife. • Increases habitat for rodents and bats. 	<ul style="list-style-type: none"> • Increases potential human-wildlife or vector contact if buildings are not sufficiently wildlife/vector proofed.

Table 1: Typical Health Impact Issues associated with Zoonotic Disease Transmission		
Industry Activity	Effect	Emerging Infectious Disease Issues
Water Management (Including creation of new water bodies, altering existing water bodies, and changes in drainage patterns)	<ul style="list-style-type: none"> • Insect-breeding habitat created or modified. • Animal watering areas created or modified. • Increases competition for water resources. 	<ul style="list-style-type: none"> • Food and water storage containers contaminated by nuisance wildlife. • Increases potential for shared use of and competition for water between humans and wildlife.
Project-Induced Migration/Displacement and Resettlement (camp followers, job seekers, family, service workers, movement of households)	<ul style="list-style-type: none"> • Increases population • Stresses community infrastructure. • Introduces an immunologically susceptible immigrant population. 	<ul style="list-style-type: none"> • Increases person-to-person contact. • Increases potential for evolution and/or amplification of disease.
Agricultural Production (including nuisance wildlife, land clearing for agriculture, and food and waste storage)	<ul style="list-style-type: none"> • Modifies existing wildlife habitat. • Provides food source for wildlife. 	<ul style="list-style-type: none"> • Increases human-wildlife contact. • Increases wildlife-domestic animal contact. • Increases potential for wildlife-livestock disease transmission.
Adapted from IFC's Introduction to Health Impact Assessment		

Effects on a project

The emergence of an infectious disease can affect industry in multiple ways including:

- Causing illness or outbreaks among employees that translates to a loss in productivity
- Requiring temporary closure of facility
- Resulting in illness or death of employees or community members

The following checklists are designed to identify those areas of an operating facility that may have vulnerabilities with respect to zoonotic disease exposure and transmission. Although this checklist and the accompanying mitigation measures are focused on zoonotic diseases, the identified vulnerabilities may apply to the broader context of maintaining worker and community health.

NUISANCE ANIMAL CONTROL/MANAGEMENT – Rodents and other “pest” wildlife can carry zoonotic disease and are attracted food storage, agriculture, and waste areas.	Yes	No	N/A	Notes
1. Do on-site features exist that could attract wildlife (food storage, food waste storage, waste accumulation, open water sources, agricultural production – grain or fruit production, livestock, pets)?				
2. Are pest control/management measures in place to minimize interaction with wildlife or to prevent wildlife from accessing the facilities?				
a. Do they address:				
i. Food storage protection provisions				
ii. Food waste storage and disposal				
iii. Housing protection				
iv. Safe removal of animal droppings and nests				
v. Controls at disposal areas				
vi. Food crop protection				
vii. Livestock protection				
3. Are specific measures in place to address the following species:				
a. Rodents				
b. Bats				
c. Non-human primates				
d. Other species of concern				
<i>If you answered no to questions that have shaded boxes, see Nuisance Animal Control Measures.</i>				

ON-SITE INFRASTRUCTURE (Maintaining a healthy work force and reducing potential exposure contact with animals or their excreta reduces the risk of zoonotic disease transmission¹)	Yes	No	N/A	
ON-SITE HOUSING (Pests can reside in on-site housing. In addition, inadequate space, food storage, sanitation, etc. can amplify any disease incident)				
1. Are workers housed on the work site?				
a. Do the living quarters conform to Workers' accommodation: processes and standards: A guidance note by IFC and the EBRD (http://www1.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/ifc+sustainability/publications/publications_gpn_workersaccommodation)?				
i. Are there adequate beds for the number of workers?				
ii. Are there adequate washing facilities?				
iii. Are there adequate sanitation facilities				
iv. Are there sufficient waste disposal facilities?				
FOOD (Food can be contaminated by pest animals at any step of the food acquisition to consumption process. In addition, certain meats may be contaminated by disease)				
1. Are workers fed at the work site?				
a. Is a Hazard Analysis Critical Control Point (HACCP) system or comparable food safety program in place (http://www.fda.gov/food/foodsafety/hazardanalysiscriticalcontrolpointshaccp/default.htm)?				
b. Are WHO's Five Keys to Safer Food implemented (http://www.who.int/foodsafety/consumer/5keys/en/)?				
c. Is food stored in rodent proof locations or containers?				
d. Are measures in place to ensure that meat is only bought from vendors who do not sell bushmeat?				

¹Most of the questions in the Onsite Infrastructure are taken or adapted from IFC and EBRD n.d. Workers' Accommodation: Processes and Standards - A guidance note by IFC and the EBRD

ON-SITE INFRASTRUCTURE (Maintaining a healthy work force and reducing potential exposure contact with animals or their excreta reduces the risk of zoonotic disease transmission¹)	Yes	No	N/A	Notes
e. Are measures in place to inspect fruits and vegetables to prevent serving food that has been contaminated by animals (presence of feces, bite marks)				
WATER (Water can attract wildlife and become contaminated. It can also act as habitat for vectors)				
1. Is the site checked regularly for standing/stagnant water, structures, or debris that can act as insect breeding areas?				
2. Do workers have access to an adequate and convenient supply of free potable water, and is it always available to workers?				
3. Does drinking water meet national/local or WHO drinking water standards?				
a. Is drinking water quality monitored or treated regularly?				
4. Are water storage tanks used for drinking water covered to prevent the water from becoming polluted or contaminated?				
SOLID WASTE (Solid waste, sewage, and food waste can attract pests)				
1. Are wastewater, sewage, food and any other waste materials disposed of according to local or World Bank standards?				
2. Are containers for trash collection provided and emptied on a regular basis?				
3. Is pest/vector control and disinfection conducted throughout the living facilities?				
<i>If you answered no to questions that have shaded boxes, see Onsite Infrastructure control measures</i>				

WORKER HEALTH (To be able to address a potential outbreak, the company should have a baseline health profile for each employee and the incidence of disease on site and locally. Workers should be trained about communicable disease prevention, and the company should be prepared for potential outbreaks)	Yes	No	N/A	Notes
1. Are workers' health care needs addressed by a Project clinic?				
a. Is each employee given a physical before employment to establish base line records?				
b. Are workers screened for communicable diseases?				
c. Are workers vaccinated?				
d. Are diseases monitored and reported to the local health department?				
2. Are workers trained on local public health issues (communicable diseases, food- and water-borne diseases, insect-borne diseases, STDs, and HIV/AIDS)?				
3. Does your facility have a disease outbreak response plan?				
a. Are procedures in place to identify, plan for, and respond to disease outbreaks?				
b. Are the procedures reviewed and revised on a periodic basis, including after disease outbreaks?				
4. Does the Health and Safety Plan address human-animal contact and zoonotic disease prevention?				
<i>If you answered no to questions with shaded boxes, see Worker Health Protection Measures.</i>				

HUNTING AND BUSHMEAT CONCESSION (A company may not have complete control over all practices that occur within a concession. Hunting of wildlife and consumption of bushmeat can expose people to zoonotic diseases).	Yes	No	N/A	Notes
BUSHMEAT (Bushmeat is a potential source for zoonotic diseases)				
1. Is bushmeat consumed in the area in which the business is operating?				
a. Does the company have a bushmeat policy?				
i. Does it prohibit hunting within concession boundaries?				
ii. Does it prohibit transport of bushmeat in facility vehicles?				
b. Has the company limited available access roads to the concession?				
c. Does the company prohibit access to the concession by non-employees?				
d. Does the company have guard/control posts on major roads in project areas/concessions to conduct vehicle inspections for bushmeat?				
e. Does the company provide training on the risks associated with bushmeat hunting and consumption and proper slaughtering methods to workers and the community?				
<i>If you answered no to questions with shaded boxes, see Bushmeat Control Measures.</i>				

OFF-SITE COMMUNITY HEALTH (Community health can be affected by the influx of workers and other migrants).	Yes	No	N/A	Notes
1. Has the project caused a population influx to the communities surrounding the concession?				
a. Is the community infrastructure capable of absorbing the existing or anticipated population?				
i. Housing				
ii. Potable water/waste water				
iii. Waste management/disposal				
iv. Health facilities				
v. Vector Control				
b. Does the community have adequate drainage to prevent creation of vector habitat?				
c. Does the community have features to prevent nuisance animals from accessing				
i. Agriculture?				
ii. Food storage?				
iii. Community waste disposal?				
iv. Centralized food waste disposal?				
v. Surface water bodies?				
2. Is there a health facility within 20 km of your facility?				
a. Does the health facility have the capability to track disease incidences?				
b. Does the health facility track local disease outbreaks?				
c. Does your facility communicate and share information with the local health facility about infectious disease incidences and unusual illnesses?				
3. Does your disease outbreak response plan include measures to address community outbreaks?				
<i>If you answered no to multiple questions with shaded boxes, see Community Health Protection Measures.</i>				

TERRESTRIAL BIOLOGICAL RESOURCES – Habitat disturbance and degradation can alter wildlife ecology and may lead to changes in wildlife disease dynamics. Changes in biodiversity may impact the potential for zoonotic disease transmission.	Yes	No	N/A	Notes
1. Loss of vegetation/habitat and creation of edge effect				
a. Are measures in place to minimize additional loss of wildlife habitat/fragmentation?				
b. Are measures in place to re-vegetate areas disturbed by construction or maintenance using native vegetation?				
2. Are plans in place to manage natural vegetation in areas adjacent to cleared areas/the project site?				
3. Biodiversity Monitoring				
a. Are measures in place to minimize wildlife disturbance (e.g. migration, migration)?				
b. Is a biodiversity monitoring plan in place?				
i. If yes, then has it been integrated with operations to ensure the appropriate best management practices (BMPs) are in place?				
c. Are measures in place to address biodiversity loss?				
<i>If you answered no to questions that have shaded boxes, see Biodiversity Preservation Measures.</i>				

MITIGATION MEASURES

This section provides mitigation measures that can help address potential vulnerabilities. These measures are not comprehensive; rather they represent actions available to a facility in response to vulnerabilities identified in the above checklists. Most measures have been drawn from existing recommended best management practices developed by international banks including World Bank, International Finance Corporation, African Development Bank and organizations such as the International Union for Conservation of Nature, International Council on Mining and Metals and the Energy and Biodiversity Initiative, and researchers. Figure 2 lists the highest priority mitigation measures. Following Figure 2, the mitigation measures are separated into the checklist categories (e.g., Nuisance Animal Control/Management, Worker Health) and include priorities for each category. **When determining mitigation measures to implement, the facility should consult with local experts to address site-specific vulnerabilities and appropriate control measures.**



Figure 2: Priority mitigation measures for preventing zoonotic disease emergence and transmission

Nuisance Animal Control Measures

Priority Measures

- 1. Establish a food safety, water and sanitation program to ensure proper sanitation and hygiene among workers and canteen operators (improved sanitation and waste management/access to clean food and water).**
- 2. Develop an integrated pest control and management plan.**

Planning/Management

- Develop a nuisance animal control management plan in consultation with local communities based on the following information:
 - The potential issues that will arise with nuisance wildlife within the vicinity of the project;
 - The potential nuisance species known or inferred; and
 - The location of the project area in relation to nuisance wildlife habitat including protected areas, existing human settlement(s) and/or continuous forest.
 - Establish protocols and policies regarding the control of nuisance animals that at a minimum conform to local laws.
- Hire a staff member from the local community to serve as a point of contact to deal with wildlife issues as they arrive. This person can act as a liaison between the company and stakeholders, including communities, government, conservation partners, and/or independent researchers.
- Educate employees and local community members on nuisance wildlife issues (e.g. crop raiding, food and waste invasions) and measures to be taken to reduce contact between humans and wildlife and livestock and wildlife.
- Develop plans for establishing buffer zones between forests and cultivated areas, human settlements and project facilities to discourage wildlife from invading areas of human activity. They should not contain plant species that attract nuisance wildlife. For example, tea plantations and chili peppers that border protected areas keep apes out.

Measures to limit contact with nuisance animals

Rodents, Bats, Non-human Primates:

- Maintain good hygiene by covering and sealing water, food and waste containers.
- Ensure that water sources are not contaminated with wildlife feces and urine.
- Restrict access to wildlife habitats.
- Modify crop planting practices (e.g. fruit tree favorable to animals such as primates and bats could be maintained in core areas of forest fragments in order to reduce human-wildlife conflict such as crop raiding at the edges of disturbed habitats).
- Establish management procedures to prevent disease transmission to domestic animals (e.g., Do not contain livestock under trees where bats roost to prevent livestock from consuming contaminated fruit remnants dropped to the ground by bats, construct livestock pens, preferably made out of thorn hedges to prevent NHP-livestock contact).

Rodents

- Work with professionals to develop rodent control strategies that are appropriate to the site.
- Construct grass embankments in agricultural fields to keep vegetation low.
- Rodent-proof farm buildings, facilities, and houses.
- Reduce and/or remove nesting and burrowing sites by:
 - Removing piles of debris or vegetation;
 - Maintaining short and disturbed fallow areas;
 - Cutting vegetation down, especially near dwellings and facilities;
 - Setting up traps in holes of fences, facilities and homes;
 - Frequent weeding; and
 - Installing durable fences.
- Maintain predator populations that feed on rodents to control rodent populations. The role of predators in rodent control depends on the dynamics of the rodent density and disease incidence.

Non-Human primates

- Reduce crop palatability by spraying capsicum on crops.
- Implement a manure management strategy to prevent NHPs (and other pests) from exposure to livestock feces.
- Construct livestock pens, preferably made out of thorn hedges to prevent NHP-livestock contact.
- Place corrugated zinc sheets around fruit trees that are not connected to a canopy.

- Build live hedges with local species that are unattractive to non-human primates to isolate crops from forest edge. Intersperse with unpalatable crops such as chili, tea, and sisal.

Bats

- Patch holes in homes, buildings and facilities under roof overhangs, in eaves, vents, cracks, around windows, through spaces under ill-fitting boards and around pipes.
- For microbats, construct bat houses within 1/4 mile of a permanent water source, and as close to their original range as possible.
- Ensure roosting sites (e.g., trees) of fruit bats remain undisturbed and maintain a sufficient amount of available forage (e.g., fruit trees) during the project development phase.
- Play recorded sounds of bat distress calls (IUCN has reported some success but further studies are needed).
- The use of a non-toxic bird-repellent, Methiocarb, has been known to deter bats.
- Plant decoy native fruit trees as buffers around orchards.

Adapted from:

Arlet, Malgorzata and FreerkMolleman. 2007. Rodents damage crops more than wildlife in subsistence agriculture on the northern periphery of Dja Reserve, Cameroon. *International Journal of Pest Management*. 53(3): 237-243.

Belmain, Steven et. al. 2002. Assessment of the impact of rodents on rural household food security and the development of ecologically-based rodent management strategies in Zambezi Province, Mozambique. Natural Resources Institute. Final Technical Report.

Hockings, K. and T. Humle. 2009. *Best Practice Guidelines for the Prevention and Mitigation of Conflicts Between Humans and Great Apes*. Gland, Switzerland: IUCN/SSC Primate Specialist Group (PSG). 40pp.

Meerburg, B.G., M. Bonde, F.W.A. Brom, S. Endepols, A. N. Jensen, H. Leirs, J. Lodal, G. R. Singleton, H. J. Pelz, T. B. Rodenburg and A. Kijlstra. 2004. Towards sustainable management of rodents in organic animal husbandry. *NJAS*: 52-2.

Pongsiri. M. J., J. Roman, V. O. Ezenwa, T. L. Goldberg, H. S. Koren, S. C. Newbold, R. S. Ostfeld, S. K. Pattanayak, and D. J. Salkeld. 2009. Biodiversity loss affects global disease ecology. *Bioscience* 59(11): 945-954.

Mickelburgh, Simon, Anthony Hutson, Paul Racey. 1992. *Old World Fruit Bats: An Action Plan for their Conservation*. IUCN/SSC Chiroptera Specialist Group.

Stenseth, Nils Chr, Herwig Leirs, Anders Skonhoft, Stephen A Davis, Roger P Pech, Harry P Andreassen, Grant R Singleton, Mauricio Lima, Robert S Machang'u, Rhodes H Makundi, Zhibin Zhang, Peter R Brown, Dazhao Shi, and Xinrong Wan. 2003. Mice, rats, and people: the bio-economics of agricultural rodent pests. *Frontiers of Ecology and the Environment*. 1(7):367-375.

The Fund for Animals. 2003 Coexisting with Wildlife Fact Sheet #1. Practical information and advice concerning humane means of solving urban wildlife damage problems for a number of common pest species. Also provides a list of internet links for more specialized information. 4 pages.

On-site Infrastructure Control Measures

Priority Measures

1. **Assure worker camp meets hygiene and sanitation criteria/guidelines as provided by the World Bank/WHO.**
2. **Ensure that the living facilities are built with adequate materials, are kept in good repair and are kept clean and free from rubbish and other refuse (meet World Bank/IFC standards for density).**
3. **Ensure wastewater, sewage, food and any other waste materials are adequately discharged, in compliance with local or World Bank standards – whichever is more stringent – and without causing any significant impacts on camp residents, the biophysical environment or surrounding communities.**
4. **Invest in either on site health clinic/resources or community health clinic/infrastructure.**
5. **Improve biosafety of onsite food production (if any) or assure that food safety follows HACCP or internationally recognized safe food guidelines (canteen, cooking facilities are kept in a clean and sanitary condition).**

The Workers' Accommodation: Processes and Standards: A guidance note by IFC and the EBRD provides minimum standards for worker living facilities, potable water, wastewater and solid waste, canteen and cooking facilities, food safety, and medical facilities. Relevant benchmarks with the respect to the transmission of zoonotic disease include:

General

- Living facilities are located to avoid flooding and other natural hazards.
- The living facilities are built with adequate materials, are kept in good repair and are kept clean and free from rubbish and other refuse.
- The building site is adequately drained to avoid the accumulation of stagnant water.
- For facilities located in hot weather zones, adequate ventilation and/or air conditioning systems are provided.
- Pest extermination, vector control and disinfection are carried out throughout the living facilities in compliance with local requirements and/or good practice. Where warranted, pest and vector monitoring should be performed on a regular basis.

- Ensure food is fully cooked and fruits and vegetables are washed thoroughly with treated water.

Water

- Access to an adequate and convenient supply of free potable water is always available to workers. Depending on climate, weather conditions and accommodation standards, 80 to 180 liters per person per day are available.
- Drinking water meets national/local or WHO drinking water standards.
- All tanks used for the storage of drinking water are constructed and covered as to prevent water stored therein from becoming polluted or contaminated.
- Drinking water quality is regularly monitored.
- Wastewater, sewage, food and any other waste materials are adequately discharged, in compliance with local or World Bank standards – whichever is more stringent –and without causing any significant impacts on camp residents, the biophysical environment or surrounding communities.
- Specific containers for rubbish collection are provided and emptied on a regular basis. Standards range from providing an adequate number of rubbish containers to providing leak proof, non-absorbent, rust and corrosion-resistant containers protected from insects and rodents. In addition, it is best practice to locate rubbish containers 30 meters from each shelter on a wooden, metal, or concrete stand. Such containers must be emptied at regular intervals (to be determined based on temperatures and volumes generated) to avoid unpleasant odors associated with decaying organic materials.

Bedrooms/Dormitories

- Rooms/dormitories are kept in good condition and are aired and cleaned at regular intervals. They are built with easily cleanable flooring material.
- Sanitary facilities are located within the same buildings and provided separately for men and women.
- Density standards are expressed either in terms of minimal volume per resident or of minimal floor space. Usual standards range from 10 to 12.5 cubic meters (volume) or 4 to 5.5 square meters (surface) per resident.
- A minimum ceiling height of 2.10 meters is provided.
- In collective rooms, which are minimized, in order to provide workers with some privacy, only a reasonable number of workers are allowed to share the same room. Standards range from 2 to 8 workers.
- All doors and windows should be lockable, and provided with mosquito screens where conditions warrant.
- A separate bed for each worker is provided. The practice of “hot-bedding” should be avoided.
- There is a minimum space between beds of 1 meter.
- Double deck bunks are not advisable for fire safety and hygiene reasons, and their use is minimized. Where they are used, there must be enough clear space

between the lower and upper bunk of the bed. Standards range from 0.7 to 1.10 meters.

- Each worker is provided with a comfortable mattress, pillow, cover and clean bedding.
- Bed linen is washed frequently and applied with repellents and disinfectants where conditions warrant (malaria).

Sanitation

- Sanitary and toilet facilities are constructed of materials that are easily cleanable.
- Sanitary and toilet facilities are cleaned frequently and kept in working condition.
- An adequate number of hand wash facilities are provided to workers. Standards range from 1 unit to each 15 persons to 1 unit per 6 workers. Hand wash facilities should consist of a tap and a basin, soap and hygienic means of drying hands.
- An adequate number of shower/bathroom facilities are provided to workers. Standards range from 1 unit to 15 persons to 1 unit per 6 persons.
- Showers/bathrooms are conveniently located.
- Shower/bathroom facilities are provided with an adequate supply of cold and hot running water.

Canteens

- Canteen, cooking and laundry facilities are built in adequate and easy to clean materials.
- Canteen, cooking and laundry facilities are kept in a clean and sanitary condition.
- Canteens have a reasonable amount of space per worker. Standards range from 1 square meter to 1.5 square meters.
- Places for food preparation are designed to permit good food hygiene practices, including protection against contamination between and during food preparation.
- Kitchens are provided with facilities to maintain adequate personal hygiene including a sufficient number of washbasins designated for cleaning hands with clean, running water and materials for hygienic drying.
- Food preparation surface are smooth, durable, and washable.
- Adequate facilities for cleaning, disinfecting and storage of cooking utensils and equipment are provided.
- Food waste and other refuse are to be adequately deposited in sealable containers and removed from the kitchen frequently to avoid accumulation.
- When importing food for employees, use a supplier that has an internationally recognized food certification system. If using local food suppliers, find a reputable supplier. Conduct spot checks to find out where food is being sourced and how it is stored.

Adapted from:

IFC and EBRD. 2009. Workers' accommodation: processes and standards - A guidance note by IFC and the EBRD.

http://www1.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/ifc+sustainability/publications/publications_gpn_workersaccommodation

Other useful references

International Finance Corporation General Environmental, Health, and Safety

Guidelines <http://www1.ifc.org/wps/wcm/connect/554e8d80488658e4b76af76a6515bb18/Final%2B-%2BGeneral%2BEHS%2BGuidelines.pdf?MOD=AJPERES>

World Bank water and sanitation standards <http://water.worldbank.org/water/shw-resource-guide/institutions/regulations-and-standards/environment>

World Bank Landfill siting criteria - <http://www.ingenieroambiental.com/nov/landfillsitingdesign.pdf>

Africa Development Bank – Study on Solid Waste Options in Africa http://www.iwwa.eu/images/stories/PDF/Study_SWM_Africa_by_ADB.pdf

Worker Health Protection Measures

Priority Measures

- 1. Provide routine health screening and surveillance for workers and include a baseline disease assessment and a routine preventative health plan, including immunizations.**
- 2. Provide health education that includes information on zoonotic diseases and health hazards from hunting, slaughtering and consuming bushmeat. .**
- 3. Develop disease outbreak response plans.**

- Provide surveillance and active screening and treatment of workers.
- Provide worker educational programs:
 - Personal sanitation,
 - Personal food safety, and
 - Endemic communicable diseases and their prevention.
- Develop and implement an outbreak response plan.
- Coordinate with local health officials to stay abreast of any local disease outbreaks.
- Provide treatment through standard case management in on-site or community health care facilities.
- Ensure ready access to medical treatment, confidentiality and appropriate care, particularly with respect to migrant workers.
- Promote collaboration with local authorities to enhance access of workers families and the community to public health services and promote immunization.

Adapted from:

IFC 2007 Environmental, Health, and Safety (EHS) Guidelines GENERAL EHS GUIDELINES: COMMUNITY HEALTH AND SAFETY. [http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_GeneralEHS_3/\\$FILE/3+Community+Health+and+Safety.pdf](http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_GeneralEHS_3/$FILE/3+Community+Health+and+Safety.pdf)

Bushmeat Control Measures

Priority Measures

- 1. Provide employees with adequate sources of protein or access to protein to minimize bushmeat hunting and consumption.**
- 2. Prohibit access to concessions by non-workers.**
- 3. Implement checkpoints and controls for bushmeat at all forest access points.**
- 4. Educate community and workers about bushmeat hunting and consumption.**

Within the footprint of the facility to stop hunting and transport of bushmeat -

- No hunting within designated no-hunting zones.
- No weapons within concessions.
- No admission to the concession is allowed by non-employees.
- No bushmeat is allowed to be transported by company vehicles.
- Post No Hunting signs.
- Establish guard/control posts on major roads in project areas/concessions, and conduct vehicle checks.
- Limit number of access roads by creating natural obstructions following construction, establish barriers such as locked gates, remove temporary access structures such as bridges.

Measures to take inside the footprint of the facility to limit demand for bushmeat

- Ensure employees are provided with food (or protein alternatives) or paid enough.

Measures to take outside the footprint of the facility

- Establish educational initiatives that teach conservation awareness.
- Establish community hunting zones.
- Have local communities inform authorities of foreign hunters.
- Conduct periodic surveys of bushmeat consumption.

Adapted from:

Aviram, R., M. Bass, and K. Parker. 2003. *Extracting Hope for Bushmeat: Case studies of oil, gas, mining and logging industry efforts for improved wildlife management. Uncertain Future: the Bushmeat Crisis in Africa.* 57 pages.

Community Health Protection Measures

Priority Measures

1. **Conduct health education and outreach on communicable diseases including zoonoses with emphasis on food safety, STIs and vector-borne diseases, vaccination, waste management, bushmeat reduction efforts, etc. Include workers and community leaders.**
2. **Improve community health and veterinary infrastructure.**
3. **Improve water and sanitation infrastructure.**
4. **Provide access to healthcare services for employees.**

Project-induced migration can facilitate transmission of communicable disease in communities surrounding facilities if their infrastructure is taxed beyond its capacity. During operations, a facility can:

Manage migration

- Plan workforce recruitment.
- Manage/control access routes.
- Control worker transportation and housing.
- Manage material transportation and procurement.
- Use buffer zones – physically separate the project from migrants.
- Address “pull” factors.

Manage the physical and social footprint of migration by:

- Using spatial planning, administration, and resource allocation -
 - Identifying appropriate settlement sites, and
 - Ensuring appropriate infrastructure, services, and utilities.
- Assisting with Community Development Initiatives related to health and food security.

Improve stakeholder engagement and monitoring by:

- Defining project-affected populations, and
- Building stakeholder capacity (IFC 2009).

Prevent illness among workers in local communities by:

- Undertaking health awareness and education initiatives, for example, by implementing an information strategy to reinforce person-to-person counseling

- addressing systemic factors that can influence individual behavior as well as promoting individual protection;
- Training health workers in disease treatment;
 - Conducting immunization programs for workers in local communities to improve health and guard against infection; and
 - Providing health services.

Adapted from:

IFC 2007 Environmental, Health, and Safety (EHS) Guidelines GENERAL EHS GUIDELINES: COMMUNITY HEALTH AND SAFETY. [http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_GeneralEHS_3/\\$FILE/3+Community+Health+and+Safety.pdf](http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_GeneralEHS_3/$FILE/3+Community+Health+and+Safety.pdf)

IFC 2009. Project and People: A Handbook for Addressing Project-Induced In-Migration. http://www.ifc.org/ifcext/sustainability.nsf/Content/Publications_Handbook_Inmigration

Biodiversity Preservation Measures

Priority Measures

- 1. Minimize road and corridor construction and edge effect (e.g., avoid paving roads, engage planning with government and other companies).**
- 2. Assure the maintenance of wildlife corridors between forest patches.**
- 3. Conduct baseline biodiversity surveys and routine monitoring in compliance with established guidelines.**
- 4. Implement hunting and wildlife trading controls within all project operational areas (e.g. roads, logging concessions, camp boundaries, camp, etc.).**
- 5. Where possible minimize ecological footprint of the project through reduced impact logging, planning to minimize fragmentation, and other established biodiversity conservation best practices.**

Maintenance

- Schedule harvesting and clearing activities to avoid breeding and nesting seasons for any critically endangered or endangered wildlife species.
- Clearly demarcate all protected areas with fences or flagging to avoid inadvertent destruction through ignorance or carelessness. In larger areas designate measures that avoid unintentional destruction of biodiversity by working with other landholders.
- Manage riparian zones to preserve water quality and wildlife habitat. Riparian zones should maintain corridors of natural vegetation to allow for the movement of animals and plants.
- Use light, rather than heavy equipment, if possible.
- Determine the appropriate controls to help to maximize the use of seeds, soil nutrients and soil biota, decaying organic matter, logs and other potential fauna habitat that can be valuable for habitat restoration.

Clear cutting, forest harvesting, deforestation:

Planning

- Leave (reserve) trees or groups of trees in the harvest concession for regeneration purposes, food sources, cover, and travel corridors for wildlife,

including raptors. Retain hollow trees that provide den and nesting sites. Appropriate conservation of understory species, as well as snags, slash, and wood debris, should also be considered to enhance wildlife habitat.

- Retain buffer strips along water courses.
- Natural vegetation should not be treated with pesticides.
- Retain natural unlogged refugia adjacent to or within harvesting blocks.
- Apply reduced impact logging techniques.
- Debark trees to prevent the spread of insects and potential diseases unless there are sound commercial or ecological reasons to not debark.
- Develop and manage areas that are similar to those lost during construction in order to offset losses of biodiversity.
- Use selective removal of trees and shrubs to allow for re-establishment through minimized cutting and clearing.
- Do not cut trees that are larger in diameter than local regulations permit, or in the absence of regulations greater than 20 cm or 8 inches in diameter.
- Avoid large canopy holes by limiting proximity of trees to be harvested.

Construction/Maintenance

- In clearing vegetation, use hand-cutting techniques to the extent possible, thereby avoiding the use of heavy machinery.
- Cut vines prior to harvest where vines connect tree crowns.
- Carry out directional felling by trained crews to minimize canopy damage and distance to skid trails. Cut stumps low to the ground and optimize crosscutting of tree stems to maximize yield.
- Use low impact log hauling and extraction methods, such as cable hauling and log lifting.
- Keep the workforce within defined boundaries and access routes.
- Light sources should be properly shaded and directed to onsite areas.
- Do not burn brush and uprooted material.
- Where vegetation and soil are removed, ensure proper separation and storage. Collect seed, root stocks and brush for subsequent revegetation.

Road Maintenance/construction

- Construct roads during dry seasons.
- Avoid nesting and migration periods when clearing vegetation.
- Construct bridges over water courses.
- Minimize brush and woody debris along roadside to reduce rodent habitat.
- Install fencing or plant barriers.
- Reduce barriers or obstacles, such as fallen logs and roadside ditches, to wildlife movement.
- Work inward, away from large rivers, ridgelines and forest edges that serve as physical barriers or social boundaries of ape populations. Working away from

these barriers will prevent pushing ape populations towards impassible landscapes.

- Roadside strips should be left vegetated with natural cover.
- Create corridors of habitat between forest patches by:
 - Maintaining intact forest along streams and rivers;
 - Retaining canopy 'bridges' over roads and taking other measures to facilitate animal movement, such as building tunnels under roads;
 - Ensuring that roads do not impede water movement at stream crossings; and
 - Revegetating degraded land.
- Minimize edge effect:
 - Allow secondary growth and vines to grow to provide a buffer ;
 - Minimize road width in order to minimize wind and microclimatic effects ; and
 - Use mowing and brush cutting instead of herbicides or fire to maintain clearings.
- Avoid paving roads, to the extent practicable.

Traffic

- Develop traffic control measures- speed limit, signage for motorist to be aware, roadside reflectors to scare wildlife away.
- Restrict nighttime driving.

Control for the potential spread of invasive species

- Steam clean, wash, and/or spray incoming and outgoing vehicles (do not do in streambeds).
- Eradicate invasive alien species that become established.
- Prior to entry into tropical production forests, ensure that shoes, equipment and vehicles are free of propagules of potentially invasive alien species.

Adapted from:

The Energy and Biodiversity Initiative (EBI). 2003. Good Practice in the Prevention and Mitigation of Primary and Secondary Biodiversity Impacts.

<http://www.theebi.org/products.html>

Hockings, K. and T. Humle. 2009. *Best Practice Guidelines for the Prevention and Mitigation of Conflicts Between Humans and Great Apes*. Gland, Switzerland: IUCN/SSC Primate Specialist Group (PSG). 40pp.

International Council on Mining and Minerals (ICMM). 2003. Good Practice Guidance for Mining and Biodiversity. <http://www.icmm.com/page/1182/good-practice-guidance-for-mining-and-biodiversity>

International Finance Corporation (IFC). 2006. Performance Standard 6: Biodiversity Conservation and Sustainable Natural Resource Management.

Laurance, W.F. et al. 2009. Impacts of roads and linear clearings on tropical forests. *Conservation Biology*. 20(4): 1251–1261.

Morgan, D. and Sanz, C. 2007. Best Practice Guidelines for Reducing the Impact of Commercial Logging on Great Apes in Western Equatorial Africa. Gland, Switzerland: IUCN SSC Primate Specialist Group (PSG). 32pp.

DRAFT