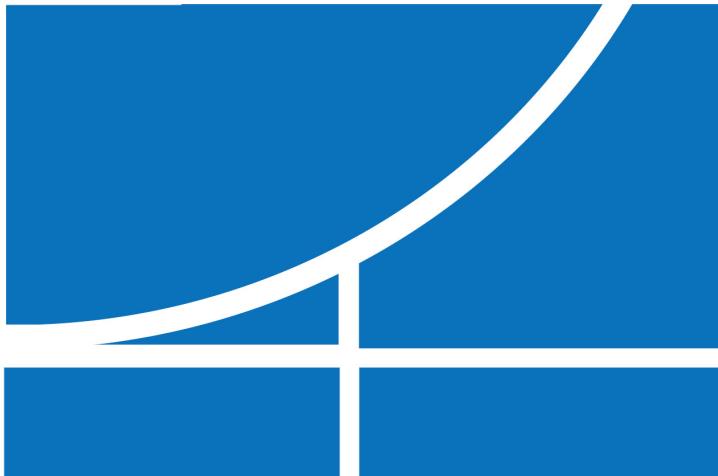




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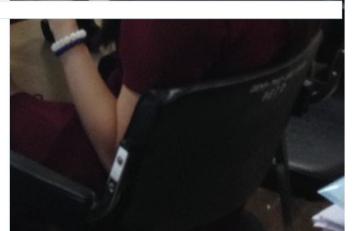
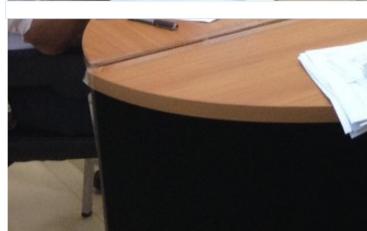


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Preparedness & Response
ONE HEALTH IN ACTION

AUDIT CHECKLIST TO REDUCE POTENTIAL EXPOSURE TO EMERGING INFECTIOUS DISEASES



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Glossary

Bushmeat	Wild meat harvested/hunted for food consumption. The term is typically used in the context of the tropics or sub-tropics.
CITES Appendix I, II and III	The Convention on the International Trade in Endangered Wild Fauna and Flora, which regulates the international trade of over 35,000 species (posted at https://cites.org/eng/app/index.php). The Appendices are lists of species afforded different levels or types of protection from over-exploitation (with Appendix I afforded the greatest level of protection). More than 182 countries are party to CITES and are free to enact stronger national regulations beyond CITES requirements for the protection of endangered species.
Emerging Infectious Disease	Infectious diseases, whose incidence in humans has increased in recent decades or threatens to increase in the near future, have been defined as "emerging." These diseases include new infections resulting from changes or evolution of existing organisms, known infections spreading to new geographic areas or populations, previously unrecognized infections appearing in areas undergoing ecologic transformation, and old infections reemerging as a result of antimicrobial resistance in known agents or breakdowns in public health measures. Examples include Ebola virus, Marburg virus, Zika virus, and certain avian influenza viruses (definition adapted from the U.S. Centers for Disease Control and Prevention).
Forest perimeter/edge	Transition areas between one type of habitat and another along the "edge" of an ecosystem. These may be created in certain landscape conversion, e.g. forest clear-cutting, and may introduce opportunities for contact (e.g. humans and wildlife, domestic animals and wildlife) between "within" forest and "outer" forest areas.
Fragmentation	Changes that produce fragments of land versus single contiguous landscapes. These may increase the potential for forest or other habitat edges and may interrupt wildlife corridors.
Invasive species	Introduced species (also known as invasive alien, exotic, or non-native species). May also be a pest. Establishment of invasive species may result in changes in ecological dynamics with effects of natural resource provision (e.g. changes in water quality), and may threaten native biodiversity as well as serve as vectors for introduced or local pathogens.
IUCN	The International Union for the Conservation of Nature, an international network of conservation scientists, organizations, and national wildlife authorities.

IUCN Red List of Threatened Species	The global authority on the conservation status of wild species (http://www.iucnredlist.org/), based on relative risk of extinction for the global population. Countries may also develop National Red Lists of Threatened Species.
Pest/Nuisance Animal	An animal associated with negative encounters or damages to human populations, agricultural/livestock production, or natural resources, potentially in competition for resources (e.g. space, food, water). This term is highly situation-dependent.
PPE	Personal protective equipment, such as masks, gloves, coveralls, and other equipment that can help provide a barrier for exposure. To adequately protect against certain exposures, specialized equipment, training on use, and fit testing should be provided (e.g. for certain types of masks).
Wildlife	Wild form of non-domestic plants and animals. Typically domestic animals that live free in the wild are considered feral animals rather than wildlife. Some species have wild and domestic forms, such as <i>Sus scrofa</i> , which includes the Eurasian wild boar and the domestic form, the domestic pig.
Wildlife Trade	Animals (may also include plants) sourced for human use (e.g. food, pet or luxury trade or medicinal application.) Wildlife trade is typically differentiated by legal or illegal/illicit based on local, national, and international regulations.
Zoonotic Disease/Zoonoses	Disease caused by an infectious pathogen transmitted from an animal to a human. Zoonoses may be known or novel/emerging. While evolutionary/genetic traits shape zoonotic potential and the severity of disease produced, the transmission of zoonotic pathogens from an animal to human requires some opportunity to facilitate contact for exposure. Once an initial spillover event occurs, some zoonotic diseases may be transmitted from person-to-person.

AUDIT CHECKLIST

INTRODUCTION

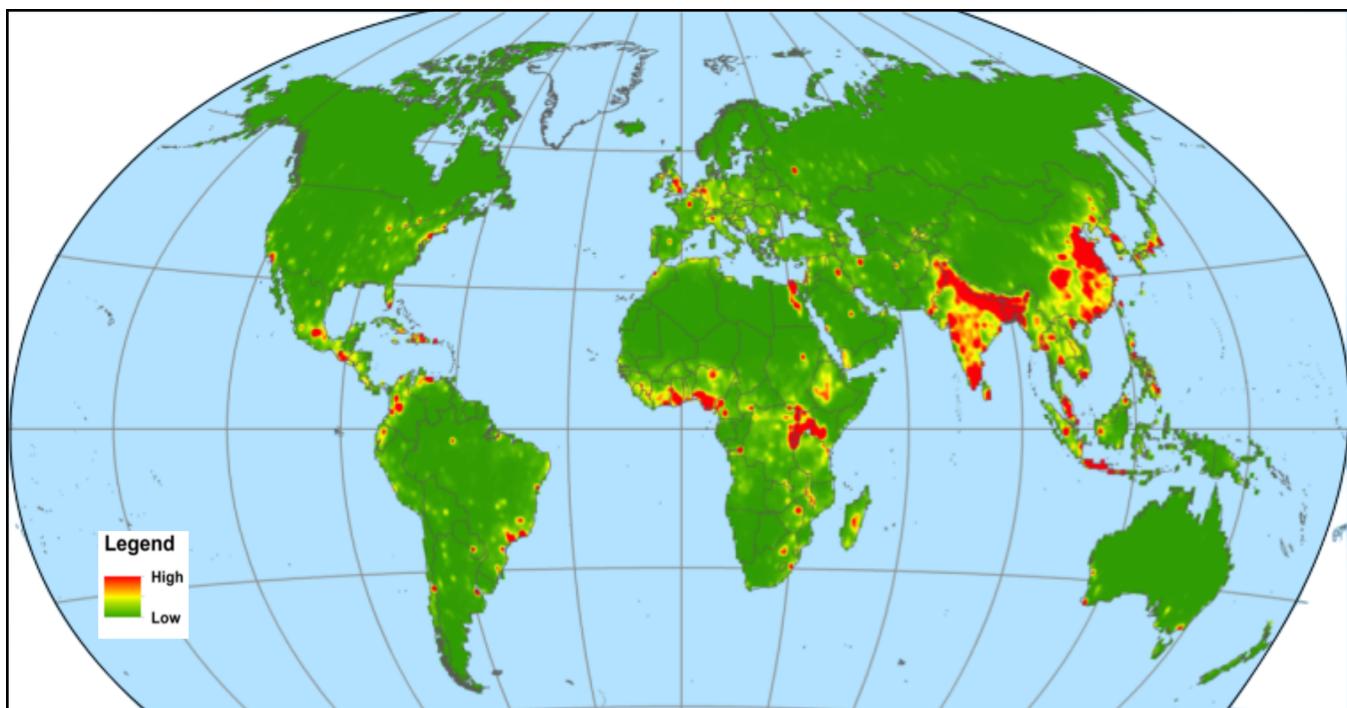
The 2014 Ebola Outbreak in West Africa brought to light the devastating effects of emerging infectious diseases on local populations as well as the severe disruption to economies and to the industries operating in the area. The need for tools to assist industry in preparing for, and ideally preventing, future potential outbreaks and associated workplace and community disruptions was apparent. This package of materials is designed to help operating facilities assess where they have vulnerabilities to emerging infectious diseases. It begins with a brief description of the dynamics of infectious disease emergence and their potential linkages to, and impacts on, extractive industries. Following the background section are checklists that can be used to identify possible areas of vulnerability. Following each checklist are control measures that facilities could use if none are in place. The mitigation measures listed provide representative measures. Not every control measure is necessary in all locations. After completing the checklists, each facility can consult with a local expert to address potential vulnerabilities and determine the appropriate site-specific control measures.

The original version of this checklist was tested at several mining facilities and with consultants who work in the extractive industries. This version reflects the input received from those consultations.

Zoonotic diseases emerging from animals to humans may or may not spread further via person-to-person infections (rabies virus does not, whereas there was widespread human-human Ebola virus transmission). *The primary emphasis of this checklist and associated planning tool is targeting zoonotic disease prevention at the source*, addressing the risk of initial spillover from animal to human. While some of the practices highlighted in this tool may also support prevention, early detection, and control of other diseases, they should be viewed as complementary with existing vector-borne, food safety, and worker and community disease guidelines.

EMERGING INFECTIOUS DISEASES

Nearly three-quarters of the known zoonotic (transmitted from animals or originally of animal origin) emerging infectious diseases (EIDs) originate in wildlife. Three wild animal groups, which comprise approximately 70 percent of mammal species, are considered most likely to spread new infections to people: bats (e.g. Coronavirus responsible for SARS, as well as Marburg and Henipah viruses), rodents (Lassa, Hantavirus, and Monkeypox viruses), and non-human primates (Ebola and yellow fever viruses). People contract these diseases by contacting wildlife pathogens whether through inhaling 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, or through ingesting contaminated food, water, or undercooked meat. Figure 1 illustrates areas of the world that have been identified as “hot spots” for the emergence of unknown infectious diseases. The map was prepared with information on prior emergence (1940 – 2004) and associated risk factors such as population density and mammalian biodiversity.



Hotspots risk map of wildlife emerging infectious diseases



EcoHealth Alliance

Source: Toph Allen, Kris A. Murray, Carlos Zambrana-Torrelio, Stephen S. Morse, Carlo Rondinini, Moreno Di Marco, Kevin J. Olival, Peter Daszak. 2016. Global correlates of emerging zoonoses: anthropogenic, environmental, and biodiversity risk factors.

In review.

Figure 1: Relative risk of map of emerging infectious diseases from wildlife

Many animal species – including people – carry zoonotic diseases. Diseases such as influenza (e.g. H5N1) or Ebola were first transmitted from wildlife or livestock to people and then by person-to-person exposure. Deforestation and habitat fragmentation and degradation and practices associated with them are changing the interactions between people and wildlife. For example, as new roads are opened in previously undisturbed areas, some wildlife species will seek alternate food and shelter resources or be hunted for consumption or sale, bringing them into closer contact with people. In some cases, the existing population has built up immunity to these types of diseases from ongoing exposure. However, new populations do not have immunity. In addition, livestock and wildlife may serve as intermediary hosts for vector-borne diseases (e.g. Rift Valley Fever, Yellow Fever), potentially putting people at additional risk. Thus, vector control is relevant for zoonoses prevention, particularly where land-use changes are taking place that may support vector habitat. As has been demonstrated by the 2014-2015 Ebola outbreaks in West Africa, areas particularly vulnerable to outbreaks of any novel disease or known disease, in general, are those with a limited health care infrastructure and poor infection-control mechanisms.

EFFECTS OF INDUSTRIAL ACTIVITY

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

Table 1: Industrial Activities that could modify Zoonotic Disease Dynamics		
Industry Activity	Effect	Zoonotic Disease Issues
Construction/operation of facilities, work camps, roads, pipelines, railroads, etc.	<ul style="list-style-type: none"> • Modifies existing wildlife and vector habitat • Wildlife range can be restricted - existing wildlife corridors can be affected resulting in restricted range or closer contact between people and wildlife, or greater pressure on populations or ecosystems in fragmented or degraded habitat • Wildlife can search for new food and shelter sources in work camps and any new settlements • Machinery/equipment may introduce invasive species 	<ul style="list-style-type: none"> • Increases human-wildlife contact • New pathogens may be introduced to the habitat through invasive or domestic species • New interactions among wildlife species previously never in contact
Roadways, transportation routes, transmission lines	<ul style="list-style-type: none"> • Modifies existing wildlife and vector habitat • Increases access to remote undeveloped areas • Increases bushmeat hunting or wildlife trade • Can interfere with migration corridors and water flows 	<ul style="list-style-type: none"> • Increases human-wildlife contact • Potential consumption of bushmeat • Potential wider geographic spread of disease • Increase accessibility for domestic and peridomestic animals
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 peridomestic animals • Insect-breeding habitat created or modified 	<ul style="list-style-type: none"> • Increases potential human-wildlife or vector contact if structures are not sufficiently wildlife/vector proofed
Water management (Including creation of new water bodies, altering existing water bodies, and changes in drainage patterns)	<ul style="list-style-type: none"> • Insect (vector) 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 people 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, including health systems • Introduces an immunologically susceptible immigrant population • Alters food supply chains 	<ul style="list-style-type: none"> • Increases person-to-person contact • Increases potential for evolution and/or amplification of disease

Table 1: Industrial Activities that could modify Zoonotic Disease Dynamics

Industry Activity	Effect	Zoonotic Disease Issues
Agricultural production (including and clearing for agriculture, and food and waste storage)	<ul style="list-style-type: none">Modifies existing wildlife and vector habitatProvides food source for wildlife. May be attractive to pests	<ul style="list-style-type: none">Increases human-wildlife contactIncreases wildlife-domestic animal contactIncreases potential for wildlife-livestock disease transmission

Modified from IFC's Introduction to Health Impact Assessment

EFFECTS ON A PROJECT

If workers are exposed to a novel or known infectious disease, the work place can be affected in multiple ways including:

- Causing illness or outbreaks among employees that translates to a loss in productivity
- Requiring temporary closure of facility and/or delayed project schedule, thus reducing cash flow
- Resulting in illness or death of employees or community members
- Increasing business liability risks/cost – specifically increased insurance premiums and increased staff turnover
- Increasing demand on the project's healthcare infrastructure, particularly if local infrastructure is inadequate
- Disrupting transport and travel of personnel and goods
- Distorting management responsibilities and resources due to emergency planning and response scenarios
- Damaged reputation

The widespread 2014-2016 Ebola outbreak in three Western-Africa countries illustrates the economic ramifications of a large-scale outbreak of a zoonotic disease, and prior outbreaks of Marburg virus originating from spillover from bats in mining sites (Kitaka gold mine in Uganda in 2007 and Goroumbwa mine in the Democratic Republic of Congo in 1998-2000), including one that led to a two-year mine shutdown in Uganda, show the potential economic impact of even isolated outbreaks.¹

PREVENTION AND MITIGATION

The focus of these prevention and mitigation measures is on the reduction and elimination of exposure to pathogens from rodents, bats, and non-human primates. By addressing certain high-risk pathogen transmission pathways, some of the approaches may also help minimize exposure to food, water-borne, vector-borne, and other communicable diseases; however, specific approaches for control of these should be sought via other resources (as they may involve particular integrated pest management techniques, water infrastructure requirements, and other strategies outside of the scope of this Audit Checklist). Similarly, while some measures reinforce biodiversity conservation, these guidelines are not intended to be

¹ Knust B et al. Multidistrict Outbreak of Marburg Virus Disease-Uganda, 2012. *The Journal of Infectious Diseases*. 2015; 212 Suppl 2:S119-28.

comprehensive for biodiversity management; additional resources should be consulted for topics outside the scope of these guidelines (e.g. invasive species prevention and control).

Experts from the United States Agency for International Development (USAID) Emerging Pandemic Threats program have identified key prevention strategies that a company could adopt as well as audit checklists **to identify those departments, divisions, and areas of an operating facility that may be vulnerable to zoonotic disease exposure and transmission.** Box 1 lists the priority mitigation measures that a facility can undertake to decrease exposure to, and transmission of, emerging and existing infectious diseases.

Because zoonotic disease prevention needs a multi-faceted approach, many different departments would be involved in any audit. Divisions likely to be involved include health, safety, and environment; community relations; social or corporate responsibility; medical; camp service; food services; and possibly others. Although these checklists and the accompanying mitigation measures are focused on zoonotic diseases, the identified vulnerabilities apply to the broader context of maintaining worker and community health by

Box 1

Priority Mitigation 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). Consider integrating pest control/management into this program.
2. Provide adequate living facilities that are rodent, bat, and vector-proof.
3. Provide workers with health education that includes information on basic sanitation, food and water safety, and infection control; zoonotic diseases and health hazards from hunting; and slaughtering and consuming bushmeat. This education should be part of the larger corporate health and safety culture, so that employees trust the information that they received and will share it with their communities.
4. Implement hunting and wildlife trade controls within all project operational areas (e.g., roads, logging concessions, camp boundaries, camp, etc.).
5. Develop a disease outbreak response plan in coordination with the local health department.
6. Provide routine health screening and surveillance for workers and include a baseline disease assessment and a routine immunization plan.
7. Establish an on-site health clinic for workers.
8. Improve community health and veterinary infrastructure.
9. Provide employees with adequate sources of protein or access to protein to minimize bushmeat hunting and consumption.
10. Minimize road and corridor construction and habitat disturbance/degradation/fragmentation (e.g., avoid paving roads, engage planning with government and other companies).
11. Conduct baseline biodiversity surveys and routine monitoring in compliance with established guidelines. Implement a notification system to report wildlife disease and mortality incidents to appropriate local authorities.
12. Assess potential for direct and indirect contact of workers and animals and employ risk mitigation measures to prevent contact (biting, scratching etc.) and exposure to pathogens (urine, feces, saliva) (e.g. use of personal protective equipment, hygiene capabilities, etc.).

reducing the potential transmission of communicable, and food, water, or vector-borne infectious diseases.

The overall aim of the mitigation measures is to reduce potential contact between wildlife (including its fluids and excreta), people, and domestic animals in addition to reducing disease transmission pathways among people. The mitigation measures are not comprehensive. Rather, they represent actions available to a facility to respond to vulnerabilities identified in the checklists. Certain mitigation measures may prove unfeasible or ill-advised because of the stage of the project, its size, or other factors. Most measures have been drawn from existing recommended best management practices developed by international banks including World Bank, International Finance Corporation, 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. The mitigation measures are separated into the checklist categories (e.g., On-site Infrastructure, 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.**

CHECKLISTS

VERMIN/PEST ANIMAL/ CONTROL AND MANAGEMENT CHECKLIST

Rodents and other “pest” wildlife can carry zoonotic disease and are attracted to food storage, agriculture, and waste.	Yes	No	N/A	Notes
1. Are measures in place to deter attracting wildlife to locations of food storage, food waste storage, waste accumulation, open water sources, or agricultural production (grain or fruit production or livestock)?				
2. Are vermin control/management measures in place to minimize interaction with wildlife or to prevent wildlife from accessing both temporary and permanent facilities?				
a. Do they address:				
i. Food storage protection				
ii. Food waste storage and disposal				
iii. Housing protection				
iv. Safe removal of animal droppings and nests				
v. Waste dumps or landfills controls				
vi. Food crop protection				
vii. Livestock protection				
viii. Water source protection				
3. Are specific measures in place to manage the following types of wildlife and feral animals:				
a. Rodents				
b. Bats				
c. Non-human primates				
d. Other species of concern (e.g. dogs, etc)				

If you answered no to questions that have shaded boxes, see Vermin or Pest Animal Control Measures.

VERMIN/PEST 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 vermin or pest animal control management plan in consultation with local communities based on the following information:
 - The potential nuisance species known or suspected in the area;
 - The potential issues that will arise with pest or nuisance wildlife within the vicinity of the project (i.e. dogs or rodents at waste dumps or sites where garbage is stored); and
 - The location of the project area in relation to nuisance wildlife habitat including protected areas, existing settlement(s), and/or continuous forest.
- Establish protocols and policies regarding the control of nuisance animals that at a minimum conform to local laws.
- Establish a process for equipment sanitation measures to prevent invasive species introductions (potential pests), if possible.
- Where livestock is present on-site, biosecurity measures should be used to reduce/eliminate wildlife predation/interaction and wildlife access to livestock food and water sources.
- Hire a staff member from the local community (providing training in environmental management and human-animal conflict resolution as needed) 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 people and wildlife, and livestock and wildlife.
- Develop plans for establishing buffer zones between forests and cultivated areas, settlements and project facilities to discourage wildlife from invading areas occupied by people. 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 Pest or Nuisance Animals

Wildlife may become pest or nuisance animals when they seek out food or shelter at camps or facilities. Steps should be taken to minimize attractiveness of housing and food and water storage areas to pests, and to maintain sufficient areas of habitat and corridors to minimize/prevent wildlife displacement and intrusion into areas where people are present. While pest control may be necessary in certain settings (e.g.

residences, canteen and food storage areas), blanket culling measures around a temporary camp or permanent facility are rarely appropriate and may have negative outcomes (for example, they may open up a niche for establishment by other pest animals, may change disease dynamics, may threaten biodiversity, may reduce yield of positive ecosystem services, expose people and other animals to harmful chemicals, etc.). Thus, in addition to health experts, wildlife authorities/environment managers should be consulted on decision-making for pest control.

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, if possible.
- Establish management procedures to prevent disease transmission to domestic animals (e.g., do not house, feed, or let livestock graze under trees where bats roost so livestock will not consume contaminated fruit remnants dropped to the ground by bats. Construct livestock pens, preferably made out of hedges to prevent non-human primate (NHP)-livestock contact.

Rodents

- Work with professionals to develop rodent control strategies that are appropriate to the site.
- Construct grass embankments in agricultural fields so that rodents have places to hide.
- 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.

Non-Human Primates

- Reduce crop palatability by spraying capsicum on crops.
- 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 and vents; cracks around windows; through spaces under ill-fitting boards; and around pipes.
- For microbats, construct bat houses within one-quarter 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.
- The use of a non-toxic bird-repellent, Methiocarb, has been known to deter bats.
- Plant decoy native fruit trees as buffers around orchards.

Other Pests

- Maintain good hygiene by covering and sealing water, food, and waste containers.
- Employ integrated pest management programs to reduce vector abundance and potential for breeding, as well as contact with people.
- Assess presence of feral animals (e.g. dogs, feral swine) to determine potential contamination risks and take appropriate action (e.g. rabies vaccination campaigns for dogs).

Adapted From:

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ON-SITE INFRASTRUCTURE CHECKLIST

ON-SITE INFRASTRUCTURE CHECKLIST				
Maintaining a healthy work force and reducing potential contact with animals or their excreta reduces the risk of zoonotic disease transmission. ²	Yes	No	N/A	Notes
ON-SITE HOUSING				
Pests can reside in on-site housing. In addition, inadequate space, food storage, sanitation, etc. can amplify disease transmission.				
1. Are workers housed on the work site? If no, skip to FOOD.				
a. Do the living quarters conform to <i>Workers' accommodation: processes and standards: A guidance note by IFC and the EBRD</i> (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, including handwashing facilities at housing and eating 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 farm-to-table continuum. In addition, certain foods may be more vulnerable to disease contamination such as meat, milk, eggs, etc.				
1. Are workers fed at the work site? If no, skip to WATER.				
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 (http://www.who.int/foodsafety/consumer/5keys/en/) or comparable safety guides implemented?				
c. Is food stored in rodent-proof locations or containers?				

² Most of the questions in the On-Site Infrastructure Checklist 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 CHECKLIST				
d. Are measures in place to ensure that meat is only bought from vendors who do not sell bushmeat?				
e. Are measures in place to inspect fruits and vegetables and to wash and peel where appropriate 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 support habitat for vectors that can carry and transmit pathogens.				
1. Is the site checked regularly for standing/stagnant water, structures, or debris that can act as insect breeding areas or attract animals seeking watering holes?				
2. Do workers have access to an adequate and convenient supply of free potable water?				
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 that are used for drinking water covered to prevent the water from becoming polluted, contaminated, or vector breeding areas?				
WASTE MANAGEMENT				
Solid waste, sewage, and food waste can attract pest animals.³				
1. Are wastewater, sewage, food, and any other waste materials disposed of according to local or IFC/World Bank standards? <i>Water and sanitation, including wastewater and sewage:</i> http://www.ifc.org/wps/wcm/connect/e22c050048855ae0875cd76a6515bb18/Final%2B-%2BWater%2Band%2BSanitation.pdf?MOD=AJPERES				
<i>Waste Management, including food waste, trash, landfills:</i> http://www.ifc.org/wps/wcm/connect/1cd72a00488557cfbd4ff6a6515bb18/Final%2B-%2BWaste%2BManagement%2BFacilities.pdf?MOD=AJPERES&id=1323162538174				

³ Medical waste is not addressed specifically in this audit, but references to information on medical waste disposal are included in the On-Site Infrastructure Control Measures.

ON-SITE INFRASTRUCTURE CHECKLIST				
2. Has the need for personal protective equipment (PPE) been assessed? Is PPE available for all waste-handling personnel in line with waste classification definitions for hazardous and non-hazardous waste?				
3. Are containers for trash collection provided and emptied on a regular basis?				
4. Is pest/vector control and disinfection conducted throughout and surrounding the living and kitchen facilities?				
5. Is vector management addressed as part of management plans for any company-managed waste disposal facilities?				
6. Is vector management addressed as part of management plans for any potential standing water sources, such as insecticide application?				
7. If there is an on-site landfill, are food wastes covered regularly?				
8. If there is an on-site landfill, is an integrated pest control program in place to control vermin?				
<i>If you answered no to questions that have shaded boxes, see Onsite Infrastructure Control Measures.</i>				

ON-SITE INFRASTRUCTURE CONTROL MEASURES

Priority Measures
1. Assure worker camp meets hygiene and sanitation criteria/guidelines as provided by the World Bank/IFC/EBRD/WHO.
2. Ensure that living facilities are built with adequate materials, are kept in good repair, and are kept clean and free from rubbish and other refuse (and 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 onsite 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 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 international or local best management practices. 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 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.
- Standing water sources that cannot be adequately covered may require insecticide or other measures to discourage vector breeding sites or control vector populations.

Solid Waste

- Containers specifically 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. Containers must be emptied at regular intervals (to be determined based on temperatures and volumes generated) to avoid unpleasant odors.
- Use World Bank siting criteria for establishing landfills. (<http://www.ingenieroambiental.com/nov/landfillsitingdesign.pdf>).
- For landfills, promptly emplace, compact, and cover wastes in defined cells, especially waste, such as food wastes, with potential to attract vermin and flies.
- At landfills, use an integrated pest control approach to control vermin levels, treating infested areas such as exposed faces and flanks with insecticide if necessary.
- At landfills, grade the area properly to prevent ponding in order to minimize insect breeding.

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.
- Residents are provided a minimum of 10 to 12.5 cubic meters (volume) or 4 to 5.5 square meters (surface).

- A minimum ceiling height of 2.10 meters is provided.
- Only a reasonable number of workers should share the same dormitory room. Standards range from two to eight 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, particularly if adequate hygiene and cleaning measures are not supported.
- The minimum space between beds is 1 meter.
- Double deck bunks are not advisable for fire safety and hygiene reasons. Where they are used, clear space between the lower and upper bunk of the bed should be 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). In certain areas, laundry should be washed with bleach and hot water and all bed linen and clothes should be ironed to make sure they are dry.
- Provide bed nets, ideally impregnated with a mosquito-repellent solution.

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-washing facilities are provided to workers. Standards range from 1 unit per 15 persons to 1 unit per 6 workers. Hand-washing facilities should consist of a tap, basin, soap, and hygienic means of drying hands.
- An adequate number of shower/bathroom facilities are provided to workers. Standards range from 1 unit per 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 with adequate and easy to clean materials.
- Canteen, cooking, and laundry facilities are kept in a clean and sanitary condition and utilize treated/potable water.
- Canteens have a reasonable amount of dining space per worker. Standards range from 1 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 washing hands with running water and soap, and materials for hygienic drying.
- Food preparation surfaces are smooth, durable, and washable.
- Adequate facilities for cleaning, disinfecting, and storing cooking utensils and equipment are provided.
- Food waste and other refuse are 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 local suppliers are sourcing food and how that food is stored.

Healthcare Waste Management

Healthcare waste management is complex and beyond the scope of this audit. Below are some resources for additional information.

- WHO's HealthCare Waste Management website <http://www.healthcare-waste.org/basics/waste-steps/>
- <https://noharm-global.org/issues/global/waste-treatment-and-disposal>
- WHO's Safe management of wastes from health-care activities (2014) http://apps.who.int/iris/bitstream/10665/85349/1/9789241548564_eng.pdf
- Health Care Waste Management Guidance Note May 2000 <http://siteresources.worldbank.org/HEALTHNUTRITIONANDPOPULATION/Resources/281627-1095698140167/Johannssen-HealthCare-whole.pdf>

Adapted From:

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

http://www.ebrd.com/downloads/about/sustainability/Workers_accomodation.pdf

IFC 2007. "Environmental, Health, and Safety Guidelines for Waste Management Facilities." <http://www.ifc.org/wps/wcm/connect/1cd72a00488557cfbd4ff6a6515bb18/Final+-+Waste+Management+Facilities.pdf?MOD=AJPERES&id=1323162538174>

Medical Entomology, Centre for Disease Control, Department of Health and Families, Northern Territory Government. "Guidelines for Preventing Mosquito Breeding Sites Associated with Mining Sites. Mine site guidelines." November 2005. <http://www.health.nt.gov.au/library/scripts/objectifyMedia.aspx?file=pdf/32/40.pdf&siteID>

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

ON-SITE WORKER HEALTH CHECKLIST

ON-SITE WORKER HEALTH CHECKLIST				
	Yes	No	N/A	Notes
Companies should have a worker health protection program to address occupational health and safety that includes a baseline health profile for each employee. To be able to address a potential outbreak, the company should track the incidence of disease on-site and locally. Workers should be trained about communicable disease prevention. The company should be prepared for potential outbreaks of endemic infectious diseases and be able to respond to a suspected emerging disease situation.				
1. Are workers' health care needs addressed by a project clinic? If no, please skip to Question 2.				
a. Is each employee given a physical before employment to establish baseline records?				
b. Are workers screened for communicable diseases? ⁴				
c. Are workers vaccinated?				
d. Are diseases monitored and reported to the local health department?				
e. Are priority diseases reported according to the appropriate international and national health regulations?				
2. Are workers trained on local public health issues (communicable diseases, food- and water-borne diseases, insect-borne diseases, TB, STDs, and HIV/AIDS) and provided education on avoiding contact with wildlife?				
3. Is the risk of an infectious disease outbreak recognized in the project's risk management register?				
4. Does your facility have a disease outbreak response plan?				
a. Are procedures in place to identify, plan for, and respond to disease outbreaks?				

⁴ Please note that communicable disease screening should only be used to establish medical history of workers and should not be used for hiring discrimination.

ON-SITE WORKER HEALTH CHECKLIST				
b. Are the procedures reviewed and revised on a periodic basis, including after disease outbreaks?				
c. Has the outbreak response plan been coordinated with the local and regional health authorities?				
5. Does the local health facility have an outbreak response plan? If no, please skip to Question 6.				
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?				
c. Has the outbreak response plan been coordinated with the project?				
6. Does the company's Health and Safety Plan address human-animal contact and zoonotic disease prevention?				
7. Are occupational activities periodically assessed to identify any high-risk interfaces for disease transmission?				
a. Are employees provided with, and required to wear, personal protective equipment in high-risk settings?				
b. Are employees provided training (and, where appropriate, fit testing) for personal protective equipment?				
<i>If you answered no to questions with shaded boxes, see Worker Health Protection Measures.</i>				

WORKER HEALTH PROTECTION MEASURES

Priority Measures
<ol style="list-style-type: none">1. Provide routine health screening and surveillance for workers and include a baseline disease assessment and a routine preventative health plan, including immunizations.2. Support local initiatives to provide health education that includes information on applicable zoonotic diseases and health hazards from hunting, slaughtering, and consuming bushmeat.3. Develop disease outbreak response plans in coordination with local and regional health authorities.4. Assess the risk of disease outbreaks as part of project risk management.5. Provide access to healthcare services for local employees.

- Provide surveillance, and actively screen and treat workers for known endemic diseases.
- Have a plan when unknown febrile diseases are suspected (potential emerging diseases), including access to a laboratory with advanced diagnostic capabilities (and proper cold chain and biosecure shipping infrastructure) and chain of command for reporting to local and national health authorities.
- Provide worker education programs on:
 - Personal sanitation, specifically on handwashing
 - Personal food safety, and
 - Endemic communicable diseases and their prevention, including on avoidance of feeding or other contact with wildlife (including as pets).
- Develop and implement an outbreak response plan that considers multiple scenarios (e.g. evacuation, isolation, etc.)
- Develop and implement a business continuity plan that considers multiple scenarios (e.g. closed borders, 10 to 30 percent of the work force affected, compromised transportation systems, food insecurity).
- Coordinate with local health and environment officials to stay informed about any local disease outbreaks in people and wildlife. Ensure that there is a reporting structure to notify wildlife authorities of wildlife disease/mortality events.
- Ensure that disease reporting is consistent with local and national health authorities and that it is consistent with the international health regulations.

- Provide treatment through standard case management in onsite 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.
- Conduct periodic assessment of occupational activities to determine if workers have the potential to come into contact with wildlife or their excreta. If there is high potential for interaction with wildlife or their excreta, provide personal protective equipment for workers (e.g. wearing masks may help protect against aerosolized pathogens as well as reduce inhalation of particulate matter, and wearing gloves may help protect against bites and scratches). Proper fit for some protective gear may require individual fit testing. Ventilation should be provided in mining or other settings where there is a risk of aerosolized transmission of rodent or bat feces.
- When there are outbreaks of diseases that involve fever, establish temperature screening at facility entry and exit points.

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)

World Health Organization. "INTERIM VERSION 1.2 Ebola and Marburg virus disease epidemics: preparedness, alert, control, and evaluation." August 2014. WHO/HSE/PED/CED/2014.05
http://apps.who.int/iris/bitstream/10665/130160/1/WHO_HSE_PED_CED_2014.05_eng.pdf?ua=1&ua=1

OFF-SITE COMMUNITY HEALTH CHECKLIST

OFF-SITE COMMUNITY HEALTH CHECKLIST				
	Yes	No	N/A	Notes
Many on-site workers are from the local communities, so infectious diseases in the community can spread to the workplace. Community health can be affected by the influx of workers and other migrants.				
1. Is a health care facility operational in the local community? If no, please skip to Question 2.				
a. Does the community health care facility have the capacity and equipment to address the health needs of the communities it serves?				
b. Does the community health care facility have the capacity to address the annual known outbreaks for the community it serves?				
c. Does the health care facility have the capability to track disease incidences?				
d. Does the health care facility track local disease outbreaks?				
e. Does your facility communicate and share information with the local health facility about infectious disease incidences and unusual illnesses?				
2. Does the project have a relationship with the local public health authorities?				
3. Does the project disease outbreak response plan include measures to address community outbreaks?				
4. Please assess community vulnerability to infectious disease transmission from infrastructure deficiencies or cultural practices:				
a. Does the community have potable water?				
b. Does the community have a sanitation system?				
c. Does the local government maintain a waste disposal area?				
d. Does the community have adequate drainage to prevent creation of vector habitat?				
e. Does the community have features to prevent pest/nuisance animals from accessing:				

OFF-SITE COMMUNITY HEALTH CHECKLIST				
i. Agriculture?				
ii. Food storage?				
iii. Community waste/food disposal?				
iv. Surface water bodies?				
5. 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?				
b. Does adequate housing exist?				
c. Does adequate potable water/waste water exist?				
d. Does local waste management/disposal meet the needs of the growing community?				
e. Are existing health facilities adequate?				
f. Does the local government have a vector control plan in place?				
<i>If you answered no to questions with shaded boxes, see Community Health Protection Measures.</i>				

COMMUNITY HEALTH PROTECTION MEASURES

Priority Measures

- 1. Conduct health education and outreach on communicable diseases including zoonoses with an emphasis on food safety, STIs and vector-borne diseases, vaccination, water and waste management, bushmeat reduction efforts, etc. Include workers and community leaders.**
- 2. Support the improvement of community health and veterinary infrastructure.**
- 3. Support the improvement of water and sanitation infrastructure.**
- 4. Ensure that there is joint outbreak preparedness planning with local governments.**

Companies are not responsible for the health needs of the communities in which they reside. However, communicable diseases that spread through the communities in which workers reside can be brought to the work place.

Prevent illness among workers in local communities

- Undertake health awareness and education initiatives. For example: implementing an information strategy to reinforce person-to-person counseling that addresses systemic factors that can influence individual behavior as well as promote individual protection.
- Proactively dispel conspiracy theories and other, non-scientifically based explanations of communicable diseases;
- Train health workers in disease treatment.
- Conduct immunization programs for workers in local communities to improve health and guard against infection.
- Provide health services.

Preparedness and response planning

- Collaborate with local health authorities on disease outbreak preparedness and response planning.
- Ensure that the local health authorities are aware of the company's plan.
- Hold a joint simulation exercise to test the plan.

Support implementing public health measures in the local communities

- Provide assistance with local planning for waste disposal, potable water, and health care facilities.
- Educate community representatives about vector breeding sites control and maintaining drainage during rainy seasons.
- Provide support to district health vector control programs.
- Provide assistance with retrofitting or designing boreholes so that they comply with local regulations, protect against potential contamination, and do not create vector breeding habitat.

- Support the training of local community health personnel in infectious disease surveillance and outbreak response.
- Collaborate with local waste management services to develop non-hazardous waste management plans for local communities that can include:
 - Sufficient garbage cans and dumpsters.
 - Garbage stored in rodent-proof containers.
 - Sanitary and solid waste collected daily and covered daily with a solid layer of soil (15 to 30 cm).
 - Appropriate container program to avoid waterborne insect breeding.
- Support improvement of local market biosecurity measures.

Project-induced migration can facilitate transmitting communicable disease in communities that surround facilities if local infrastructure is taxed beyond its capacity. During operations, a facility can:

Manage migration

- Use the IFC's or comparable guidance on addressing project-induced in-migration to guide actions to prevent in-migration. Activities to undertake can include:
 - Plan workforce recruitment.
 - Manage/control access routes to the concession.
 - Control worker transportation and housing.
 - Manage material transportation and procurement.
 - Use buffer zones; physically separate the project from migrants.

Manage the physical and social footprint of migration

- Use spatial planning, administration, and resource allocation.
 - Identifying appropriate settlement sites.
 - Ensuring appropriate infrastructure, services, and utilities.
- Assist with community development initiatives related to health and food security.
- Avoid habitat conversion and fragmentation from spontaneous settlements and economic activities

Improve stakeholder engagement and monitoring

- Define project-affected populations.
- Conduct regular and predictable stakeholder engagement.
- Build stakeholder capacity (IFC 2009).

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

HUNTING, BUSHMEAT, AND WILDLIFE TRADE CHECKLIST

HUNTING, BUSHMEAT, AND WILDLIFE TRADE CHECKLIST				
Hunting of wildlife and consumption of bushmeat can expose people to zoonotic diseases. While companies may not have complete control over all practices that occur within a concession, they should take steps to ensure compliance with and enforcement of local/national laws and risk reduction practices.	Yes	No	N/A	Notes
BUSHMEAT				
Bushmeat is a potential source for zoonotic diseases.				
Company				
1. Is bushmeat consumption prohibited in the area in which the project is operating?				
a. Does the company have a hunting policy?				
i. Does it prohibit hunting within concession boundaries?				
ii. Does it prohibit hunting within the active part of the concession?				
iii. Does it prohibit transport of bushmeat in facility vehicles?				
b. Has the company limited access to roads in the concession?				
c. Does the company have a policy to control 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 safe slaughtering methods to workers and the community?				
Community				
a. Does the community avoid subsistence hunting?				
b. Does the local market prohibit sale of bushmeat or live animals (e.g. live non-human primates for the exotic pet trade)?				

HUNTING, BUSHMEAT, AND WILDLIFE TRADE CHECKLIST				
WILDLIFE TRADE				
2. Is there a policy prohibiting workers keeping wild pets on-site?				
3. Are vehicles inspected for live or dead wildlife at exit points?				
4. Are education campaigns used to inform workers of wildlife trade and bushmeat policies?				
<i>If you answered no to questions with shaded boxes, see Hunting and Bushmeat and Wildlife Trafficking Control Measures</i>				

HUNTING AND BUSHMEAT AND WILDLIFE TRAFFICKING CONTROL MEASURES

Priority Measures
<ol style="list-style-type: none">1. Provide employees with adequate sources of protein or access to protein to minimize bushmeat hunting and consumption.2. Prohibit access to concession by non-workers, if practical and possible.3. Implement checkpoints and controls for bushmeat and wildlife trade at all forest access points, if feasible.4. Educate community and workers about bushmeat hunting and wildlife trade and consumption.

A project's approach to hunting needs to be carefully managed, ensuring that conservation and traditional and/or community land access rights are respected and enhanced for desired outcomes. This will include the establishment of policies and procedures with regards to the following: hunting, bushmeat, weapons, access etc. such that they are consistent with local, regional, and national laws and regulations. In some countries, it is not legal to limit access to a facility or prohibit traditional hunting on a concession. The following are suggestions that should be considered within the legal framework of the country in which a project is operating.

Within the footprint of the facility

To stop hunting and transport of bushmeat and live wildlife

- Prohibit hunting and trapping within designated no-hunting zones.
- Post “No Hunting” and “Wildlife cannot be removed from this facility” signs.
- Prohibit bushmeat from being transported by company vehicles.
- Establish guard/control posts on major roads in project areas/concessions, and conduct inspections at exit points (trucks, rail cars and air).
- Prohibit weapons on-site, aside from security personnel.
- Prohibit non-employees on the facility without permission.
- Prohibit keeping of wild pets (e.g. monkeys and other non-human primates).

To limit demand for bushmeat among employees

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

Within the concession

- Prohibit hunting, if legally and logistically possible.
- Post “No Hunting” and “Wildlife cannot be removed from this facility” signs and conduct education campaigns to inform workers of policies on bushmeat and wildlife trade.
- If possible, limit access to the concession by creating natural obstructions following construction, establish barriers such as locked gates, and remove temporary access structures such as bridges.
- Have employees notify the HSE manager if they find dead animals, so the HSE manager or appropriate personnel can report wildlife deaths to authorities to identify the cause.
- Ensure compliance and enforcement with local/national laws.

Measures to take with local employees and local communities

- Establish educational initiatives that teach conservation awareness.
- Establish community hunting zones.
- Through community stewardship initiatives based on conservation priorities in the area, have local communities inform authorities of the presence of foreign hunters.
- Conduct periodic surveys of bushmeat consumption.
- Encourage open communication between community health facilities and HSE manager.

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 pp.

HABITAT AND BIODIVERSITY MANAGEMENT CHECKLIST

Habitat disturbance and degradation can alter wildlife ecology and may lead to changes in wildlife disease dynamics. Changes in biodiversity may affect the potential for zoonotic disease transmission.	Yes	No	N/A	Notes
Loss or disturbance of vegetation/habitat and creation of borders unsuitable for wildlife movement.				
a. Are measures effectively minimizing wildlife habitat loss/fragmentation/degradation?				
b. Are measures in place to revegetate disturbed areas using native vegetation?				
c. Are measures effectively minimizing wildlife disturbance during migration, nesting, or breeding seasons?				
d. Are measures in place to minimize contact between humans and wildlife?				
2. Are measures in place to manage natural vegetation in areas adjacent to the project site?				
3. Are measures in place to address biodiversity loss? Are measures effectively monitoring habitat conversion, fragmentation and degradation, as well as changes in biodiversity?				
<i>If you answered no to questions that have shaded boxes, see Habitat and Biodiversity Management Measures.</i>				

HABITAT AND BIODIVERSITY MANAGEMENT MEASURES RELEVANT TO ZOONOTIC DISEASE

Priority Measures

1. Manage road and corridor construction to minimize unnecessary habitat disturbance (e.g., avoid paving roads, engage in planning with government and other companies).
2. Assure wildlife corridors between forest patches are maintained.
3. Conduct baseline biodiversity surveys and routine monitoring in compliance with established guidelines to identify high-risk species present and promote early warning systems for disease outbreaks.
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 the project footprint through reduced impact logging, minimization of fragmentation and conversion, and other established biodiversity conservation best practices that avoid displacing wildlife.

In terms of zoonotic disease, maintaining habitat corridors and access to resources (e.g., water and food sources) may help reduce potential for human-animal contact. Depending on the species, certain life stages (e.g. breeding), seasonality, and other factors (e.g. migration) may affect prevalence and transmission risk.

Maintenance

- Clearly demarcate all protected or conservation areas with fences or flagging to avoid inadvertent destruction through ignorance or carelessness that could displace animals. 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.
- Determine 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 maintenance.
- Where feasible, sanitize and inspect machinery, and conduct routine surveys for invasive species introductions that may be associated with pathogen introduction; where detected, implement control measures to prevent potential invasive species establishment.

Clear cutting, forest harvesting, and deforestation (especially relevant to timber harvesting)

Planning

- To promote habitat continuity and minimize the risk of human-animal contact, leave (reserve) trees or groups of trees in the harvest concession for regeneration purposes, food sources, cover, and travel corridors for wildlife. 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 natural unlogged refugia adjacent to or within harvesting blocks.
- Avoid large canopy holes by limiting proximity of trees to be harvested.

Construction/maintenance

- In areas with critical habitats or during critical life cycle (e.g., reproduction, nesting) for species, disturbance should be minimized to the extent possible.
- Cut vines prior to harvest where vines connect tree crowns.
- Conduct directional felling with trained crews to minimize canopy damage and distance to skid trails.
- Use low-impact log hauling and extraction methods, such as cable hauling and log lifting.
- Keep the workforce within defined boundaries and access routes.
- Shade lights and direct to onsite areas.

Road maintenance/construction

- Avoid nesting and migration periods when clearing vegetation.
- Minimize placing brush and woody debris along roadside to reduce rodent habitat.
- Reduce barriers or obstacles to wildlife movement, such as fallen logs and roadside ditches.
- Maintain wildlife corridors and work away from large rivers, ridgelines, and forest edges that serve as physical barriers to wildlife migration.
- Create corridors of habitat between forest patches by:
 - Maintaining intact forest along streams and rivers;
 - Retaining forest canopy ‘bridges’ over roads and taking other measures to facilitate animal movement, such as building tunnels under roads or creating artificial canopy bridges;
 - Revegetating degraded land using native species.
- Minimize negative effects of forest edges:
 - Allow secondary growth and vines to grow to provide a buffer;

Measures to take with local employees and local communities

- Support conservation programs linked to the project's environmental and biodiversity management plans, including awareness of conservation priorities in the area.
- Support local land-use planning in the project's area of influence and back this up with development support consistent with the land-use plan.
- Support local habitat management, including protected area management if relevant.

Biodiversity and Habitat Monitoring

- Conduct baseline biodiversity surveys and routine monitoring in compliance with established guidelines to identify species present, in particular keystone species, and their abundance (species counts). This information can be used to identify settings with increased risk for contact with species (with special attention to bats, rodents, and non-human primates) that may transmit zoonoses, as well as detect die-offs in animals that may be associated with a potential zoonotic disease.

- Monitor habitat changes like conversion, fragmentation and degradation, and how this overlaps with potential carriers of EIDs and increases the risk of contact between humans and such carriers. Target measures to reduce habitat disturbance and educational programs at high-risk zones.

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.