

**ENVIRONMENTAL IMPACTS OF HIGHLY PATHOGENIC AVIAN  
INFLUENZA AND EMERGING INFECTIOUS DISEASE**

**LESSONS LEARNED REPORT**

**ACCRA, GHANA**

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**PREPARED FOR THE AFRICA BIODIVERSITY COLLABORATIVE GROUP**

# CONTENTS

|  |                  |
|--|------------------|
| <b>1. INTRODUCTION</b>                       | <b>3</b>         |
| <b>2. SUMMARY</b>                            | <b>3</b>         |
| <b>3. KEY STAKEHOLDERS</b>                   | <b>4</b>         |
| <b>4. PRIMARY CONSERVATION IMPACTS</b>       | <b>5</b>         |
| <b>5. IDENTIFIED NEEDS</b>                   | <b>5</b>         |
| <b>6. INITIAL RECOMMENDATIONS</b>            | <b>6</b>         |
| <b>7. APPENDICES</b>                         | <b>11</b>        |
| <b><i>7.1 List of Meetings Conducted</i></b> | <b><i>11</i></b> |
| <b><i>7.2 Transcribed Meeting Notes</i></b>  | <b><i>12</i></b> |
| <b><i>7.3 List of Acronyms</i></b>           | <b><i>20</i></b> |

## **INTRODUCTION**

In late April 2007, Ghana experienced its first confirmed positive cases of H5N1 Highly Pathogenic Avian Influenza (HPAI) in the Tema district west of Accra. Over subsequent months, additional confirmed cases were reported both in the Tema district and the Brong-Ahafo and Volta regions. The outbreak was confined to commercial poultry production facilities, and all birds were destroyed as a component of a stamping out effort. As of September 2007, the outbreak had been brought under control and there have been no further reported cases of HPAI in domestic poultry. Further, surveillance in wild migratory birds has not revealed any positive HPAI cases in Ghana.

With the arrival of the HPAI virus on the African continent, and in recognition of the significant threat it poses to social, economic and development progress in Africa, an assessment of the environmental impacts of avian influenza was commissioned by the United States Agency for International Development. What follows are the results of a week-long assessment conducted in Accra, Ghana, during which meetings were held with stakeholders to discuss these critical issues. Initial recommendations are presented here to assist conservationists and local communities with efforts to prepare for and ameliorate the impacts of HPAI and future emerging infectious diseases (EID). A final report detailing both recommendations and completed outreach activities will be delivered in August 2008.

## **SUMMARY**

Over the past thirty years, approximately 75% of emerging infectious diseases have been zoonoses—pathogens such as HPAI that are readily transmissible between animal and human populations. The impact of such infectious disease is significant in Africa, where access to health care is often limited or nonexistent, and where the livelihoods of over 70% of the continent's rural poor—nearly 200 million people—are linked to livestock. Although the HPAI virus represents a pressing risk to the health and livelihoods of African communities, such populations, owing to their close contact with livestock and wildlife, continue to be at even greater risk from future emerging infectious diseases. In this light, it is important to consider HPAI as a model around which sound prevention and response policies can be created, limiting the environmental impacts of future infectious disease threats.

This assessment identified five broad threat categories through which HPAI impacts environmental and ecosystem health. These include threats to human health, wildlife health, food security, livelihoods, and ecotourism. The key stakeholder categories involved in preparedness and response to emerging infectious disease threats were: government, communities and civil society, the health sector, and bilateral and multilateral institutions. These stakeholders identified education and training; capacity building for disease surveillance and diagnosis; assistance with preparedness plans; improved food security and protection of economic stability; and diversified livelihoods opportunities as the primary needs required to lessen the environmental impacts of HPAI and similar emerging infectious diseases.

It is important to recognize that disruptions to ecosystem health often lead to increased human/animal interaction, fostering novel host-pathogen interactions that entrench illness, poverty and malnutrition, provoking further environmental damage. A central tenet in the efforts to limit these impacts should be the prevention of disease transmission opportunities, early disease detection and rapid response. A spectrum of proactive responses and activities are presented here that address the identified needs, charting a course for conservationists and local communities to consider as they prepare to limit the environmental impacts of emerging infectious disease.

## Key Stakeholders

The following key stakeholders have been involved in HPAI preparedness and response efforts in Ghana, and should be actively engaged in collaborative efforts to ameliorate the impacts of future EID events. Such stakeholders, though specific to Ghana, are considered representative of broader institutional categories that would be relevant throughout Africa.

| GOVERNMENT  | COMMUNITIES AND CIVIL SOCIETY   | HEALTH SERVICE SECTOR   | BILATERAL AND MULTI-LATERAL ASSISTANCE AGENCIES   |
|---|---|---|---|
| <ul style="list-style-type: none"> <li>• Ministry of Food and Agriculture (Veterinary Services Directorate)</li> <li>• Forestry Commission, Wildlife Division</li> <li>• Ministry of Health</li> <li>• Customs</li> <li>• Environmental Protection Agency</li> <li>• National Disaster Management Organization</li> <li>• Ministry of Tourism               <ul style="list-style-type: none"> <li>○ The Ghana Tourist Board</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• Local Communities               <ul style="list-style-type: none"> <li>○ Community Leaders (Tribal elders, chiefs)</li> <li>○ Schools</li> <li>○ Local health care facilities and diagnostic laboratories</li> <li>○ National park and wildlife officers</li> <li>○ Farmers and livestock holders</li> </ul> </li> <li>• Non-governmental and Community-based Orgs. (NGO/CBO)               <ul style="list-style-type: none"> <li>○ Ghana Wildlife Society</li> <li>○ BirdLife Int'l</li> <li>○ Ghana Red Cross</li> <li>○ ABCG member local offices (CI, WWF)</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• Animal Health: Veterinarians, para-veterinarians, and community-based animal health workers</li> <li>• Human Health: Physicians, nurses, and community-based health workers</li> </ul> | <ul style="list-style-type: none"> <li>• Bilateral Assistance Agencies               <ul style="list-style-type: none"> <li>○ USAID/USDA</li> <li>○ GTZ</li> </ul> </li> <li>• Multi-lateral Institutions               <ul style="list-style-type: none"> <li>○ FAO</li> <li>○ OIE</li> <li>○ UNICEF</li> <li>○ WHO</li> </ul> </li> </ul> |

## PRIMARY CONSERVATION IMPACTS

The impacts of infectious disease outbreaks such as HPAI upon conservation efforts can be broadly classified into the following five categories:

- Direct threats to wildlife health
- Direct threats to human health, particularly within the context of an overburdened health sector, including potential loss of conservation capacity
- Threats to food security, with indiscriminate use of alternative animal protein sources (e.g. bush meat)
- Threats to individual livelihoods and national trade revenue, contributing to unsustainable land use practices at local and national levels, such as intensified and/or unmanaged natural resource extraction (logging/charcoal production) and increased pressures on protected lands
- Threats to the ecotourism sector

### *Case Study—Impacts of Anthrax on Livelihoods in Ghana*

Outbreaks of anthrax in Ghana during the 1990s affected cattle movement dynamics and disrupted livestock markets and market chains for livestock products. Government imposed movement restrictions and quarantines limited livestock grazing options; herders who ordinarily moved animals to grazing pastures had no recourse to alternative nutrition sources for their stock. Further, markets and trade routes were closed adding to local economic impacts. Herders and market chain participants (vendors, traders) began turning to other sources of income.

Disease outbreaks must be anticipated if environmental impacts are to be minimized. Strategies may include emergency sources of livestock hay and fodder; promotion of livestock holder cooperatives that can assist with rapid sourcing of livestock nutrition; start up incentives and micro-credit to encourage farmers to develop a more diversified livestock portfolio that can weather temporary restrictions; rapid, fair disbursement of compensation to farmers for livestock culls; and emphasis on preventative measures (vaccination) that may limit disease outbreaks.

## IDENTIFIED NEEDS

The needs most commonly identified by stakeholders as critical to improve preparedness and response capacity and limit the environmental impacts of infectious disease were:

- Education, Training, and Outreach
- Capacity Building for Disease Surveillance and Rapid Diagnosis
- Support for Preparedness and Response Planning
- Contingency Planning for Food Security and Economic Stability
- Diversified Livelihoods Opportunities

## INITIAL RECOMMENDATIONS

These initial recommendations respond to the needs identified in the assessment, and represent opportunities for conservationists and communities to prepare for and respond to the environmental impacts of future emerging infectious disease outbreaks.

### *General Points of Consideration*

- **Expand Focus from HPAI to Encompass Impacts on Biodiversity Conservation from Any Future Emerging Infectious Disease Threat**  
Recognition that dynamic human-animal interactions will continue to produce EID outbreaks with impacts upon biodiversity conservation will steady the conservation community well when designing preparedness plans. HPAI may be seen as the model for consideration of impacts and preparation of plans, however, the conservation community must stand ready to respond promptly to new, as yet unidentified infectious disease threats.
- **Involve Leaders Across Levels to Ensure Buy-In of Program Activities and Agendas**  
Targeting leaders across national, regional, and local levels will be critical to ensure activities are coordinated and streamlined. Assessment workshops should involve all relevant stakeholders in order to listen and respond to the needs and concerns of a diverse set of stakeholders. At the local levels, community mobilization might best follow from engagement of tribal leaders and chiefs, as well as respected civil society players (e.g. Women's associations, unions). Education, empowerment and employment of community members are necessary for the realization of benefits over drawbacks (e.g. tolerating wildlife destruction of crops, loss of wildlife hunting and trade incomes). It is often necessary to work within the framework of local belief systems.

### *Education, Training and Outreach*

- **Strengthen Education, Training, and Outreach Activities**  
Education campaigns should focus on a variety of topics, including biosecurity, personal protection, high-risk activities (slaughter), clinical signs of sick birds/wildlife, reporting protocol, and awareness raising of the risks of disease transmission associated with bush meat hunting activities. Distribution of behavior change communication materials (print/TV/radio) should be expanded. Target audiences may include community members, farmers and livestock holders, school age children, government and community leadership, wetlands and protected reserves managers, livestock market vendors and consumers, and industry. Children should be discouraged from hunting banded birds under false assumption of monetary rewards. The media should be targeted directly to assist with accurate information dissemination, which will help limit spread of fear and panic during an outbreak. Long-term communication strategies should be established to continue proactive messaging.



D. Schar

**Avian Influenza educational materials posted on the door of a Ministry of Agriculture office in Accra, Ghana**

- **Educate Stakeholders on Low Impact Disease Management Options**  
Disease control attempts that involve wildlife culls should be strongly discouraged and utilized only as a last-resort and within a defined framework when imminent threats to human health or biodiversity can be avoided through such actions. Wildlife culls are a widely impractical and ineffective means of controlling disease transmission that carry significant risks and great costs. Similarly, stakeholders should understand the limits of, and environmental damage caused by, utilizing chemical disinfectants. Antimicrobials carry the risk of pathogen resistance. Both should be used with care and in local situations with defined, measurable outcomes.
- **Educate Stakeholders on the Role of Wild Birds in Transmission**  
Stakeholders, including government ministries, must be strongly cautioned against launching wild bird culls in the absence of objective data demonstrating risks posed to human, domestic livestock and ecosystem health directly attributable to wildlife. Such culls have historically proven ineffective in stamping out disease and pose a severe threat to wildlife biodiversity.
- **Target Communities with High Degrees of Interaction Amongst Humans, Domestic Livestock and Wildlife**  
Communities at the highest risk for initiating or perpetuating an EID event will most likely be those where humans are regularly in contact with wildlife and domestic livestock (e.g. bush meat hunters, fringe settlements near or in protected areas, wildlife and wet markets). Opportunities to target such communities with education on decreasing high-risk interactions and activities.
- **Involve the Private Sector in Workable Solutions**  
Industrial livestock production, including commercial poultry farms, should contribute to and have a stake in implementing preventative measures. Outreach to industry should be oriented toward activities that are able to limit transmissibility of EIDs (vaccination, biosecurity, personnel training), ensuring adequate preparedness strategies are in place, helping draft standard operating procedures aimed at limiting disease transmission, and leveraging resources for response to EID events as necessary.

### *Capacity Building for Disease Surveillance and Rapid Diagnosis*

- **Improve Utilization of Disease Surveillance Databases and GIS Tools**  
The Wild Bird Global Avian Influenza Network for Surveillance (GAINS) represents a rich and robust database for tracking HPAI in wild bird populations. Potential exists for GAINS to be scaled up, linking into OIE reports and incorporating disease data in domestic poultry and known epidemiological risk factors (e.g. markets, commercial poultry facilities). Additionally, GAINS could be a powerful user-directed tool at the community level, with input from community-based disease surveillance efforts used to produce maps, track disease movement in real time, and generate disease risk profiles for local communities to plan reaction strategies. Currently, wild bird surveillance data from Ghana is not being reported publicly, which could be easily remedied by awareness raising for participation in the GAINS database.
- **Further Delineate Outbreak Characteristics and Epidemiological Risk Factors within an African Context**  
The specific risk factors for HPAI transmission in Africa, such as seasonal prevalence, trade routes, markets, and wild, migratory bird involvement, have not been clearly defined. More broadly, attempts should be made to define disease impacts that shift ecosystem health out of balance.
- **Decrease Risks Associated with Live Animal Markets**  
An assessment is needed of the prevalence and risk factors associated with markets—including bush meat markets—and situations in which multiple species of live animals have the opportunity to commingle. These will be hotspots of disease transmission where preventative measures can be employed.

- **Replicate Successful Community-Based Surveillance Initiatives**  
Several community-based disease surveillance initiatives have been utilized in SE Asia to foster community involvement in combating HPAI. Such initiatives have successfully mobilized and educated local stakeholders for early reporting (via SMS text messaging) of disease outbreaks and would be invaluable in promoting awareness raising and disease reporting (both human and animal) within an African context.
- **Support for Health Professionals, Para-professionals, and Laboratory Capacity Building**  
Increased numbers of new—as well as improved capacity of existing—health professionals (physicians, veterinarians) and para-professionals (nurses, community health workers and community animal health workers/paravets) are critical components of early detection and diagnosis. Such health workers may also serve as educational outreach resources for their communities and be trained to assist with response efforts when necessary. Upgrading facilities and providing training for laboratory staff will assist with prompt and accurate diagnosis.



D. Schar

Private veterinary clinic and supply business operating in Accra, Ghana

### *Support for Preparedness and Response Planning*

- **Assist National Entities with Comprehensive and Actionable Emergency Preparedness Plans**  
Leveraging USAID resources under STOP AI to ready final preparedness plans. The full spectrum of stakeholders should be involved with preparedness planning; tabletop simulations should be conducted annually to ensure swift deployment of strategies when necessary. Institutions, from government to the private sector, should ready protocols for protecting staff and ensuring adequate human resources in the event of a pandemic; standard protocols are available from Department of Homeland Security and may be tailored to local needs and availability of resources. The environmental impacts from use of chemical disinfectants and carcass disposal should be incorporated into emergency preparedness plans. A fair, transparent and rapid procedure should be established for compensating farmers as a result of mandatory livestock culls.
- **Assist with Building National Resource Base for Emergency Outbreak Response**  
Disease outbreaks require quickly accessible stockpiles of emergency response equipment (PPE, farm machinery for carcass disposal, vaccines and anti-virals). Financial support is best



coordinated through multilateral institutions (FAO, World Bank) with bilateral assistance as necessary.

- **Consolidation of Regional Disease Surveillance, Planning, and Response Efforts**  
Prevent redundancy and improve efficacy of funding by placing all regional AI and EID efforts under a single planning and administrative body. Vertical integration fosters communication, with follow-on benefits of improved information sharing and leveraging of resources.
- **Establish Cross Cutting, Interdisciplinary Working Groups to Identify Ongoing Threats and Opportunities**  
Because EID events involve a complex range of issues at the intersect of human, livestock and wildlife health, the composition of working groups should be reflected by an equally interdisciplinary approach. Wildlife ecologists, epidemiologists, veterinarians, physicians, anthropologists, economists, public health and policy advisors should be amongst those represented.

### *Contingency Planning for Food Security and Economic Stability*

- **Encourage Diversification of Nutritional Resources and Animal-Derived Protein Sources**  
A diversified diet, not heavily reliant upon a single source of protein, will improve resilience in the face of an EID event or other livestock disease crisis. Food security may be facilitated via a diversified livestock portfolio, although careful attention is needed to prevent environments that foster disease transmission (e.g. commingling of poultry and pigs, the latter serving as mixing vessels for strains of influenza). Animal husbandry and health trainings should be an essential component of livestock diversification initiatives to best ensure success.
- **Identify and Quantify Threats to Economic Security**  
Additional research is needed to identify the specific constraints upon families resulting from infectious disease outbreaks. Inability to care for the sick, secure needed medicines, and pay for school fees are known to result from loss of income associated with disease outbreaks, however the magnitude of the impacts are not clear (e.g. number of children who drop out of school). There are informal reports of families turning to unsustainable income generating activities, such as charcoal making, yam farming in protected areas, bush meat hunting, pet trade, and transportation. However, comprehensive community assessments are needed to quantify the impacts and tailor policies to support appropriate alternative livelihoods.

### *Diversified Livelihoods Opportunities*

- **Support Sustainable, Locally Relevant Alternative Livelihoods**  
Encourage diversification of sustainable, responsible income generating activities to hedge against EID events and reduce pressure on natural resources. Promotion of sustainable ecotourism as part of a community based natural resource management strategy can create employment opportunities. Additionally, communities directly benefit from ownership of ecotourism revenues utilized for improved infrastructure and services (hospitals, schools, roads, water sources, power). Contingency plans should be made for wildlife-based ecotourism sites to provide for alternative income generating opportunities—and consideration of savings funds—to be utilized during disease outbreaks. Alternative livelihoods should be culturally appropriate to facilitate adoption.

### ***Case Study: Sustainable Alternative Livelihoods in Ghana***

Alternative livelihoods should meet several criteria if they are to be readily adopted. Transitions are often turbulent, and successful initiation requires careful consideration of options and advance planning. Ideally, alternative livelihoods should be:

- Low environmental impact and unlikely to contribute to disease transmission
- Sustainable without continued support
- Quickly deployable with simple “start-up” kits
- Sensitive to market needs
- Rapidly income generating
- Culturally appropriate

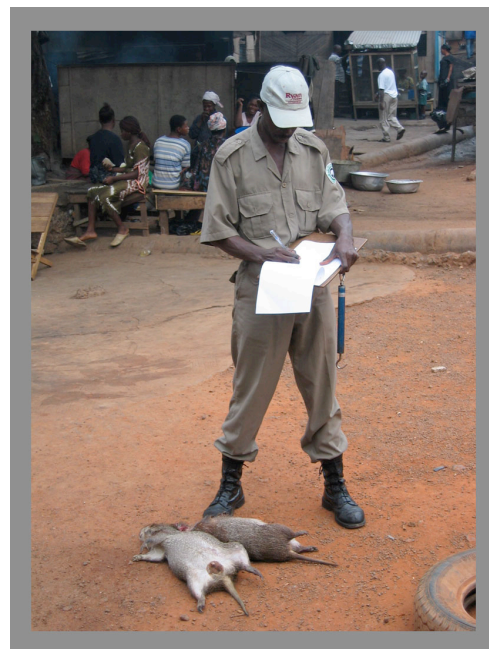
Several alternative livelihoods that have been successfully employed in Ghana include:

- Transition to ecotourism
- Rearing of alternative animal protein sources (rabbits, snails, terrestrial insects)
- Diversification of livestock and agricultural production
- Beekeeping and butterfly rearing
- Domestication of favored bush meat species, including the Grasscutter (*Thryonomys swinderianus*) rodent

- **Improved Regulation of Wildlife Trade**

More robust monitoring and regulation of wildlife trade activities will have the dual benefits of improved biodiversity conservation and decreased infectious disease transmissibility. Testing for infectious disease at bush meat markets may assist with regulatory supervision, illegal hunting enforcement, and disease detection efforts. Recognizing that livelihoods are frequently dependent upon wildlife trade activities will be important when designing educational materials and trainings for those involved, and when devising policies aimed at regulating a sustainable, low-impact wildlife trade—with ample opportunities for alternative livelihoods—rather than adopting a “no tolerance” policy that does not consider community needs.

**Wildlife officer enforcing bush meat trade at a market near Kumasi, Ghana**



A. Aemank/IFWDC

## APPENDICES

### *List of Meetings Conducted:*

#### **Forestry Commission, Wildlife Division**

Mr. Joseph Yaw Oppong  
Mr. Nana Adu-Hsiah  
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#### **Ghana Wildlife Society**

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#### **UN, Food and Agriculture Organization**

Sub-regional Office  
Dr. George Chizyuka/Mrs Ada Ndeso-Atanga  
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#### **Accra Zoo, Wildlife Division**

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#### **The Ghana Tourist Board**

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#### **Ministry of Food and Agriculture**

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#### **Environmental Protection Agency**

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#### **National Disaster Management Organization**

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#### **United Nations Children's Fund (UNICEF)**

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#### **World Health Organization**

Dr. Harry Opata  
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#### **Conservation International**

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### ***Transcribed Meeting Notes:***

May 19, 2008

Forestry Commission, Wildlife Division

Mr. Joseph Yaw Oppong/Mr. Nana Adu-Hsiah

- Responsibilities include regular monitoring of migratory birds throughout Ghana
- Surveillance activities conducted in Akatsi/Keta areas of the Volta Region
- Bird counts active in the Ashanti/Tono region, Muni-Pomadzi area of the Weneda Region and Songoi on the Keta Road
- Active sampling of birds for AI, with database collected by the veterinary services office and information transmitted to FAO
- Wild birds are monitored by the Ghana Wildlife Division (Dr. Richard Suu-Ire) and domestic poultry are monitored by the Ministry of Food and Agriculture, veterinary services directorate
- Initial AI preparedness activities dated to 2005, with WHO and FAO panel discussions
- National Disaster Management Organization has been involved with AI task force
- Spring/Summer 2007 HPAI outbreak is now contained; there are currently no migratory bird deaths observed
- 2007 outbreak impacts:
  - National level economic threat due to loss of revenue from poultry import/export restrictions
  - Adverse effects on tourism and domestic poultry consumption as a result of misinformation presented by the media
- Activities:
  - Ministry of Food and Agriculture Public Relations Office (Mr. George Kpoi) is producing brochures and educational materials targeting the media, public and school children with relevant AI preparedness and protection information
- Concerns:
  - Village children often hunt birds (particularly banded birds for which they feel they might receive some reward) and may be an appropriate target for educational outreach activities
  - Need to improve capacity of the Forrester Commission and the Ministry of Food and Agriculture to conduct outreach activities within the community
  - There is still a misconception amongst rural communities that mass culling of wild bird populations will solve the AI problem should it resurface
  - AI or other EIDs may specifically lead to more unsustainable land uses, however the comment was made that such uses (charcoal making) are currently ongoing

May 20, 2008

Ghana Wildlife Society

Mr. Augustus Asamoah

- In response to HPAI threat, a national task force was established consisting of Ministry of Food and Agriculture, veterinary services; FAO; Forestry Commission, Wildlife Division; and bilateral entities including USAID
- Team was established to assay for AI in wild birds, and to conduct bird counts in important roosting areas along the coast
- Task force distributed educational materials and conducted some moderate outreach activities in coastal communities (signs and symptoms to be aware of; clinical signs in sick birds; what to do with sick/dead found birds; adequate cooking of poultry and eggs)

- Radio and Television public service announcements are still ongoing
- Initially, it was assumed that wild migratory birds were the HPAI reservoir, and there was some call for destruction of wild birds, particularly around lagoons west of Accra shared as a water source by humans, domestic stock and wild birds
- There is now an understanding that wild migratory birds are likely only to play a small role in HPAI transmission and calls for culling wild birds have ceased
- At the onset of the 2007 outbreak, inaccurate reporting by media caused public scare and nearly led to collapse of the domestic commercial poultry industry
- Ministries are urged to make official statements early in such outbreaks to quell fears
- Environmental threats from people currently living in “protected” areas; although this is no longer permissible, it is not strictly enforced and some communities are considered to be “grandfathered in” as they were present on the land before designation
  - Additionally, should HPAI resurface in protected bird habitats, the general feeling is “to get rid of the birds before making people move out of the wetland areas”
- Felt that such issues were important, stating “there is always the possibility that a new disease will have an impact on ecosystem health”
- Future infectious disease events may force people out of current settlements and into potentially fragile areas, contributing to:
  - Disease transmission opportunities
  - Alternative economic activities that may not be sustainable
  - Population movement dynamics that pressure ecosystem health
- As an example akin to disease introduction, over-fishing in Volta Lake led to precipitous fish stock declines, which forced local communities into alternative economic activities; may be a role for locally focused community based natural resource management
- Not aware of any full time efforts to promote discussion and action around environmental impacts of infectious disease
- Identified Needs:
  - Capacity building at the ministry levels for immediate outbreak response
  - Funding for research and epidemiological investigations regarding disease dynamics
  - Information sharing, and use of real-time, updated, disease database management (such as GAINS)
  - Further discussion of human/livestock/wildlife interactions

United Nations, Food and Agriculture Organization  
 Sub-regional Office  
 Dr. George Chizyuka/Mrs Ada Ndeso-Atanga

- FAO commands regional projects dealing with HPAI preparedness and control throughout Africa
- FAO Rome manages an Emergency Center for Transboundary Animal Diseases
- Focus has extended beyond control and is now assessing social, economic and development impacts of HPAI
- In 2006, an organized stakeholders meeting was held to draft AI preparedness plan; participants were from FAO, WHO, UNICEF, and USAID
- Direct activities in Ghana have included trainings and laboratory capacity building
- Large commercial poultry farms in Ghana typically 95,000 layers/broilers
- There are significant “backyard” poultry holdings, typically 5-7 layers that produce for the household needs; any excess sold locally
- Historically, African Swine Fever was an issue, but the Government was only concerned with culling and compensation within an eradication plan; there was no attention on environmental impacts

- Will shortly begin working with UNDP to launch “Alternative Livelihoods Assessment Project” (funded FAO ~80,000USD) speaking to farmers to:
  - Identify alternative livelihoods options for poultry farmers in the wake of poultry loss
  - Activities that can be rapidly employed for economic return
  - Cultural constraints that may define these activities (e.g. some communities utilize snails as protein source, others rabbits)
  - Socio-economic impacts and implications of disease re-emergence
  - Quantify commercial poultry entities within Ghana, particularly along the border regions with Ivory Coast and Togo
- Ultimately, the goal of the project will be to prepare a package of sustainable activities that can be presented to communities to transition during poultry loss and before repopulation, if the latter is deemed prudent
- Ministry of Health will partner on the project to assess human health aspects of AI contingency plans
- Identified needs:
  - Sociological Research
    - There is no empirical evidence documenting specifically what the economic constraints are upon people from infectious disease outbreaks; we know families lose school fees and children drop out of school, but in what numbers? At what point is it appropriate to intervene?
    - Observation during 2007 outbreak that affected communities and poultry farmers moved into alternative livelihoods such as pet trading and fish selling, particularly around border communities with Togo and Ivory Coast
    - They may also be relocating to unsettled lands and engaging in other unsustainable activities such as charcoal production

Accra Zoo, Wildlife Division  
Dr. Richard Suu-Ire

- HPAI surveillance ongoing in wild birds; no confirmed positive cases in wild birds to date
- 2007 outbreak; three communities; associated with commercial poultry production
- Commercial poultry farmers have expressed concern about repopulating flocks or expanding production over fear of recrudescence of disease, which has affected the entire industry supply chain
- Outbreak has affected poultry consumption, with prices initially dropping on decreased demand and still not fully recovered; possibility of future price inflation on decreased supply following lower production
- Bush meat hunting and trade are present and thriving income generators in Ghana
  - Strongly associated with cultural leanings; the feeling was that “people are born into bush meat consumption”
  - There are well organized bush meat markets, and consumption is common
  - Practice is illegal; hunters should be permitted and licensed with stipulations on species and number allowed, however, this is poorly enforced due to poor wildlife officer capacity
  - Have been many studies and programs to discourage bush meat trade, but none of them have had much effect
  - A novel program has attempted to domesticate for production the Grasscutter (*Thryonomys swinderianus*) rodent
- There has been no formal assessment of HPAI as it relates to the bush meat trade or consumption
- Kumasi in the central region has the largest wet bird market nationally

- Has recently been an increase in trade of pet birds; suspicion that some are coming from Ghana and others across international borders from Nigeria, with obvious implications for disease transmission risk
- Ministry of Food and Agriculture, Veterinary Services is generating an “Economic Impact of AI Assessment” which has not been released
- There has been no use of the GAINS tools within the Wildlife Division, although there was considerable interest in this sort of user-directed disease database; currently, bird counts and AI surveillance results from Ghana are not being regularly updated on GAINS
- USAID was, at the time of this assessment, sponsoring an AI training conducted by Dr. Jarra Jagne at DAI
- Identified needs:
  - Additional distribution of educational materials produced by Ministry of Food and Agriculture
  - Training and education, particularly for fringe communities around the reserves, with topics such as reporting protocol, warning signs, how to protect oneself
  - HPAI trainings targeting wetlands and reserves managers
  - Education and outreach targeting wildlife hunters, markets, those involved in bush meat and wild life trade (“market queens”), and consumers
  - Possibly sponsoring proper bush meat dressing stations and minimum sanitary standards
  - Possibly regulatory testing at the largest markets, and issues associated with bringing black market industry under regulatory supervision
  - Forestry Commission, Wildlife Division needs to strengthen wild bird education to properly convey role of wild birds in HPAI transmission

May 21, 2008

The Ghana Tourist Board

Mr. Marfo Gyimah

- With respect to tourism, the projected image is that AI is not a regular occurrence and that the region is not prone to the disease
- There has been no decline in tourist numbers following the 2007 outbreak, and tourists have generally not expressed concern about AI or intention to alter travel plans as a result of the disease
- The Board worked with the Forestry Commission and Ministry of Food and Agriculture to educate tourists about proper poultry consumption
  - It was stressed that the Board is heavily dependent upon the Ministry of Food and Agriculture and Forestry Commission to prevent and contain any future outbreaks, to develop educational materials, and to develop and implement sound policies with respect to infectious disease events
  - It was felt that the Ministry of Food and Agriculture properly handled the 2007 outbreak, and that farmers had assurance of compensation for culled poultry and would not be likely to hide affected birds
- Although the Board has managed tourism related effects of natural disasters (floods), they have no prior experience with handling infectious disease threats
- The Board is not engaged in any contingency planning for re-emergence of HPAI or a future EID event, although it was acknowledged that such plans would be beneficial
- The Board representative appeared to be under the erroneous assumption that a re-emergence of HPAI in Ghana was not likely because wild migratory birds were not considered a high risk factor; there was no consideration of viral introduction through domestic poultry trading activities
- Although several ecotourism sites are focused on bird watching (notably, the Xavi bird watching sanctuary in the Volta Region), no efforts are in place to protect wild migratory birds, limit risk

- factors associated with interactions between migratory birds/humans/livestock, or plan with the community for impacts from possible bird die-offs
- Ecotourism in Ghana extends over the past decade, and the Tourist Board operates 14 ecotourism sites throughout the country; each site overseen by a locally convened Tourist Management Team, with revenues locally managed and used for infrastructure development (water, electricity), trainings, schools and libraries
    - Community members serve as home-stay hosts, in guest services (food and lodging) and as guides to the eco-regions
    - Primary collaboration with USAID, Peace Corps and WTO for support, funding and infrastructure development within the ecotourism sites
  - The importance of local community involvement (“buy in”) was deemed critical to the success of the ecotourism projects and preservation efforts
  - Working within the framework of local belief systems was also identified as an important contributor to successful outcomes
  - Working in an integrated fashion with other institutions (Forestry Commission) was important in sustainable management of eco-regions; for example, the Wildlife Division regularly conducts controlled burns in the dry season around fringe communities to manage wildfires and direct wildlife to food sources while preventing movement out of the region in search of nutrition

May 22, 2008

Ministry of Food and Agriculture

Veterinary Services Directorate

Dr. Enoch Koney

- Felt that the environmental impact in Ghana in the face of a significant outbreak of HPAI would be catastrophic
- Major issues envisaged could be attributed to inadequacy of existing biosecurity measures as well as lack of defined standard operating procedures at commercial poultry facilities to respond to and contain disease outbreaks
- Primary environmental impacts could be:
  - Inadequate disposal of contaminated and/or infected livestock and livestock products, due in part to lack of appropriate machinery and resources to accomplish this task
  - Chemical disinfectants utilized in containment that may contaminate surface and underground water reservoirs rendering them unsafe to drink
  - Effluent from inadequately disposed livestock carcasses that may contaminate surface and underground water reservoirs as well as soil used for food crop production
  - Infectious disease transmission opportunities arising from poor response procedures, including inadequate disinfection of farm machinery/equipment and inadequate biosecurity measures (poor use of personal protective equipment, foot baths, etc...)
  - Displacement of arable land as a result of poorly planned carcass disposal, thus possibly displacing farmers and affecting livelihoods
- Identified needs to address these environmental concerns include:
  - Training and education of key stakeholders involved in response activities
  - Improved resource base for response/containment activities (PPE, disinfectants, etc...)
  - Established standard operating procedures and response plans in place for immediate deployment, all of which should consider proper carcass disposal, chemical usage as well as farmer displacement and alternative livelihoods

National Disaster Management Organization

Major Nicholas Mensah (Rtd)



- National Disaster Management Organization (NADMO) is funded centrally through the federal government with some supplementary UN funding
- NADMO operated in a decentralized fashion, with offices in each district and zonal offices that work directly with the community for information delivery
- NADMO does not program directly, but rather acts as a central coordinating body for all stakeholders under disaster management conditions
- During the 2007 HPAI outbreak, NADMO coordinated and continues to host the National Task Force on Avian Influenza
  - NADMO manages the “Operations Room,” which is funded by USAID and is manned 24 hours/day
  - The “Operations Room” serves to take incoming reports via a dedicated hotline, report potential outbreaks to the responsible veterinary officer at national and local levels, and distribute information to stakeholders
- Although HPAI has been contained, the Task Force continues to operate proactively, coordinating stakeholders to communicate risks, inform the media, uphold standards by the commercial poultry industry through the Poultry Farmers Association, and ensure testing of imports and enforcement of trade restrictions
- Stakeholders include (partial): MoH, MOFA, Customs, Military and disease surveillance units
- NADMO relies on technical committees, including a “disease epidemic” committee to advise stakeholders and inform actions
- NADMO has participated in several trainings at the initiation of USAID, including one held by the Academy for Educational Development (AED)
- Feeling was that MOFA and government has done a good job encouraging backyard poultry holders to report disease, and made proper assurances of compensation
- Under previous agricultural disasters, rural communities have moved away from farming and into other income generating activities, including general goods trade and transportation; only some returned to prior agricultural pursuits
- Feeling was that the 2007 outbreak affected backyard poultry holders as well as commercial ventures; that there is still fear over poultry consumption, which affects market dynamics
- Certain that some backyard holders in the regions affected have turned to alternative livelihoods in lieu of holding poultry (reported that statistics not available), and that under a future EID event, it is probable that farmers would turn to alternative livelihoods, including bush meat hunting and trade, with intensification of bush meat hunting activity
- Some environmental concerns associated with chemicals used for disinfection
- Importance of working within cultural framework; leverage the prominence of local community leaders (Chiefs) to assist with information dissemination, organizing community events and meetings, etc...
- NADMO has worked with Ghana Red Cross and other NGOs to work directly with local communities
- Identified needs:
  - Communication, outreach and education/trainings
  - Improved information flow between stakeholders and vertically within NADMO
  - Infectious disease disaster preparedness, including vaccine, pharmaceutical and equipment stockpiles

May 23, 2008

United Nations Children’s Fund (UNICEF)

Dr. George Fom Ameh

- National Task Force for Avian Influenza was instituted prior to 2007 outbreak
- Primary stakeholders under UN auspices had been FAO (agriculture and livestock) and WHO (human health response)

- UNICEF primarily tasked with extending behavior change communication initiatives
- UNICEF worked with the communications sub-committee of the Task Force (other members: MOFA, Ghana Health Service, Ministry of Information) to develop and distribute behavior change communication materials in response to the outbreak, namely:
  - Printed materials (posters, flyers, leaflets)
  - Radio announcements and public service messages
  - Television messages to air during prime network timeframes
- Materials focused on personal safety (handwashing), biosecurity measures, and proper handling, slaughter and cooking of poultry and poultry products
- A hotline and control room were established at NADMO for farmers and community members to report suspect cases
- Educational seminars were delivered directly to the communities in the areas affected by the outbreak
- Long term communication strategies, with emphasis on continued dissemination of preventative and precautionary materials, were created

#### World Health Organization (WHO)

Dr. Harry Opata

- WHO has not been significantly involved in response to 2007 HPAI outbreak in Ghana as disease was limited to commercial poultry farms and no human cases were reported
- WHO is involved as a member of HPAI task force activities
- There has been some community based disease surveillance activity coordinated by WHO in Ghana, but not focused specifically on case identification for HPAI
- Socially, a major effect of the 2007 outbreak was fear and panic over consumption of poultry products, exacerbated by inaccurate media reports early during the outbreak
- The impacts of this panic likely included protein deficient diets for some segments of communities that rely on poultry products for protein, however there were no reports of child malnutrition directly associated with the outbreak
  - Highlights needs for media outreach to ensure accurate information dissemination in future outbreak events

#### Conservation International

Mr. Okyeame Ampadu-Agyei

- CI undertaken 3-year campaign on biodiversity conservation in the Upper Guinea Sub-region, encompassing four key elements:
  - Public Health
  - Ecotourism
  - Symbiotic human/animal interactions (species that serve as seed dispersal agents)
  - Culture (use of animal totems, etc...)
- Threats to this sub-region include: bush meat trade, over-fishing, logging and natural resource extraction
- Organized workshops with communities and community leaders to build consensus and address the issues
- Sponsored several studies in Ghana to identify threats from bush meat hunting/trade
  - “Ending Bush Meat Trade in Ghana”
    - Concluded that over 150 native species related to bush meat trade are “no longer seen”
    - Reduced numbers also related to habitat destruction
  - “Bush Meat Database” linking academic and research institutions in Ghana for information sharing related to the bush meat trade

- Media education and outreach on bush meat trade and hunting
- School children target audience outreach to effect early behavior change in cultural tastes
- Collaborative efforts with the EU bush meat campaign to screen for bush meat products entering EU ports
- Study of environmental contamination from bush meat hunting practices (organophosphate/cyanide use) and public health concerns
- Bush meat trade primarily at the market in Kumasi
- Involves mostly species that are not protected, such as duiker, porcupine, grasscutter rodent; others are protected, including spotted palm civet, black-and-white colobus monkey, and the pangolin
- Hunting is both seasonal, as supplementary income, and the primary source of livelihood for some involved in the bush meat trade
- Community based NRM in Ghana
  - Project targeting cocoa farmers to decrease environmental impact of farms; identify best practices (limiting use of underbrush burns; agrochemicals)
  - Project targeting communities that co-exist with wildlife (elephants) to identify best practices for avoiding “crop raids” and limiting conflict; employing low cost solutions (noisemakers, trench digging, capsaicin use, land use patterns that anticipate wildlife movements)
  - Community must identify the problems and see the value and the impacts of the solutions; may be difficult with HPAI because the impact has been limited to industry in Ghana
- Identified needs:
  - Promotion of ecotourism that provides alternative income opportunities to communities currently engaged in unsustainable natural resource use
    - Additional alternative income opportunities: beekeeping, butterfly farming, ornamental fishes for the aquarium trade, diversified agriculture and livestock rearing
  - Infrastructure for park development, including income and employment opportunities for the local communities
  - Analysis of disease factors that may shift ecosystem health out of balance

### ***7.3 List of Acronyms***

|         |   |
|---------|---|
| ABCG    | Africa Biodiversity Collaborative Group                   |
| AI      | Avian Influenza   |
| EID     | Emerging Infectious Disease                               |
| EPA     | Environmental Protection Agency                           |
| EU      | European Union  |
| FAO     | United Nations, Food and Agriculture Organization         |
| GAINS   | Wild Bird Global Avian Influenza Network for Surveillance |
| GTZ     | German Agency for Technical Cooperation                   |
| HPAI    | Highly Pathogenic Avian Influenza                         |
| MAFO    | Ministry of Food and Agriculture                          |
| NADMO   | National Disease Management Organization                  |
| OIE     | World Organization for Animal Health                      |
| PPE     | Personal Protective Equipment                             |
| STOP AI | Stamping Out Pandemic and Avian Influenza                 |
| UNICEF  | United Nations Children's Fund                            |
| USAID   | United States Agency for International Development        |
| USDA    | United States Department of Agriculture                   |
| WHO     | World Health Organization                                 |