Avian influenza surveillance: results of a questionnaire investigation at Kol-e-Hashmat Khan Lake, Kabul, October 2007

Compiled by:

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Wildlife Conservation Society
November 2007

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INTRODUCTION

Prior to the beginning of the Soviet-Afghan war in 1979, Kol-e-Hashmat Khan, a lake set in the outskirts of Kabul, was an important bird area in Afghanistan, supporting as many as 30,000 waterbirds during migration periods (UNEP, 2003). However, after the war, the local community has encroached on the lake, settlements have extended all around it, and drainage (legal and illegal) has contributed to threaten the wetland (Khan, 2006).

Wild waterfowl are considered the natural reservoir of avian influenza viruses (Olsen et al., 2006). They are known to carry viruses of the H5 and H7 subtypes —the two subtypes known to cause the highly pathogenic form of the disease, called highly pathogenic avian influenza (HPAI) — but usually in a low pathogenic form. Studies suggest that migratory birds can introduce low pathogenic H5 and H7 viruses to poultry, which can later mutate to the highly pathogenic form. However, in view of the current outbreaks of HPAI, which began in Southeast Asia in 2003 and spread through Eurasia in 2005, concerns have arisen that migratory birds could directly contribute to the spreading of the HPAI H5N1 virus.

Urban wetlands supporting large concentrations of migrating waterbirds and hosting in their surroundings poultries can thus be strategic locations for an early detection of cross-species transmission events. The present work intends to investigate whether Kol-e-Hashmat Khan should require active surveillance in the future. Our questionnaire investigation was carried out as part of a field exercise by trainees of a course on avian influenza surveillance in wild bird implemented by WCS and funded by FAO. All credit for this work should go to the participants of the course (Appendix I).

METHOD

Study site

Kol-e-Hashmat Khan is a shallow eutrophic lake situated in the southeastern outskirts of Kabul City. Prior to the war, the lake used to receive the waters of the Logar and Kabul rivers, and at that time water flows were strictly regulated to maintain surface level and accommodate hunting parties of the Royal family and dignitaries (Khan, 2005). Nowadays

water is too precious for the growing urban community of Kabul City to be 'wasted' in a recreational area and from both rivers it is largely diverted for human use. As a consequence water level in the lake depends mostly on winter precipitations and snowfall. Typically the water body stretches over a maximal surface of about 190 ha in spring and shrinks gradually throughout summer. After the severe drought of 1991, the lake dried out for several years (Khan, 2006). The lake is shallow in all seasons and we have measured a maximal depth of 1.20 m in May 2007, after good winter precipitations (Ostrowski, pers. obs.). Located at an elevation of about 1810 m asl (altitude recorded during present study), the lake is frozen almost every winter, at least partly. Thick beds of common reed (*Phragmites australis)* grow in the middle of the lake, and provide refuge to breeding birds during spring and summer. Reed beds are harvested to some extend by people living around the lake. Other plants found in and around the lake include *Ranunculus arvensis*, *Bromus danthoniae*, *Centaurea* sp., *Eleocharis* sp. and several species belonging to the families Cyperacae, Cruciferae and Compositae (Rahim and Larsson, 1978).

The lake offers a relatively safe resting site for migrating birds and a refuge for a dozen breeding species. Before the war, Kol-e-Hashmat Khan used to be a major roosting site for migrating birds. Documents from the 1960s report thousands of water birds visiting the area in autumn (UNEP, 2003). This was at a time when the area was safeguarded as a waterfowl reserve, yet actively hunted by royal dignitaries. Because of the progressive diversion of water for urban and agricultural use, the wetland has shrunk and no longer hosts such large numbers of migrating waterfowl (Khan, 2005; Ostrowski, pers. obs.). In 1973, the Directorate of Wildlife and National Parks declared the lake a waterfowl sanctuary, but this was never gazetted. Nowadays there are guards stationed near the lake with a mandate from the Ministry of Agriculture and Forestry to survey and protect the area.

Questionnaire

The questionnaire was designed to be as convenient, quick and none intrusive as possible. Prior to carrying out the interviews, interviewers had to report on five points: their team code (A to G), questionnaire number within team, date, GPS location, and name of the interviewed person (only if they wished). Then one interviewer of each team asked eight successive questions always in the same order. Questions were formulated to require only a 'yes/no/don't know' answer but free-time was always made available to participants to provide additional information or comments about their answers. The first two questions provide information about ownership of poultries and their recent illnesses, the following four questions give indications about past and current hunting activities in the area, and question seven documents the annual extend of change in water level. The last question is a false-negative control: we know the answer (yes) and use it to detect 'non-relevant' responders. Each team of three interviewers was asked to question one adult person in at least four different households within a relative restraint area. Questioning activities took place on October 1, 2007 between 9:30 and 11:00 am in the east part of Kol-e-Hashmat Khan Lake, where urban encroachment is major and households easily accessible from the main road (Figure 1).

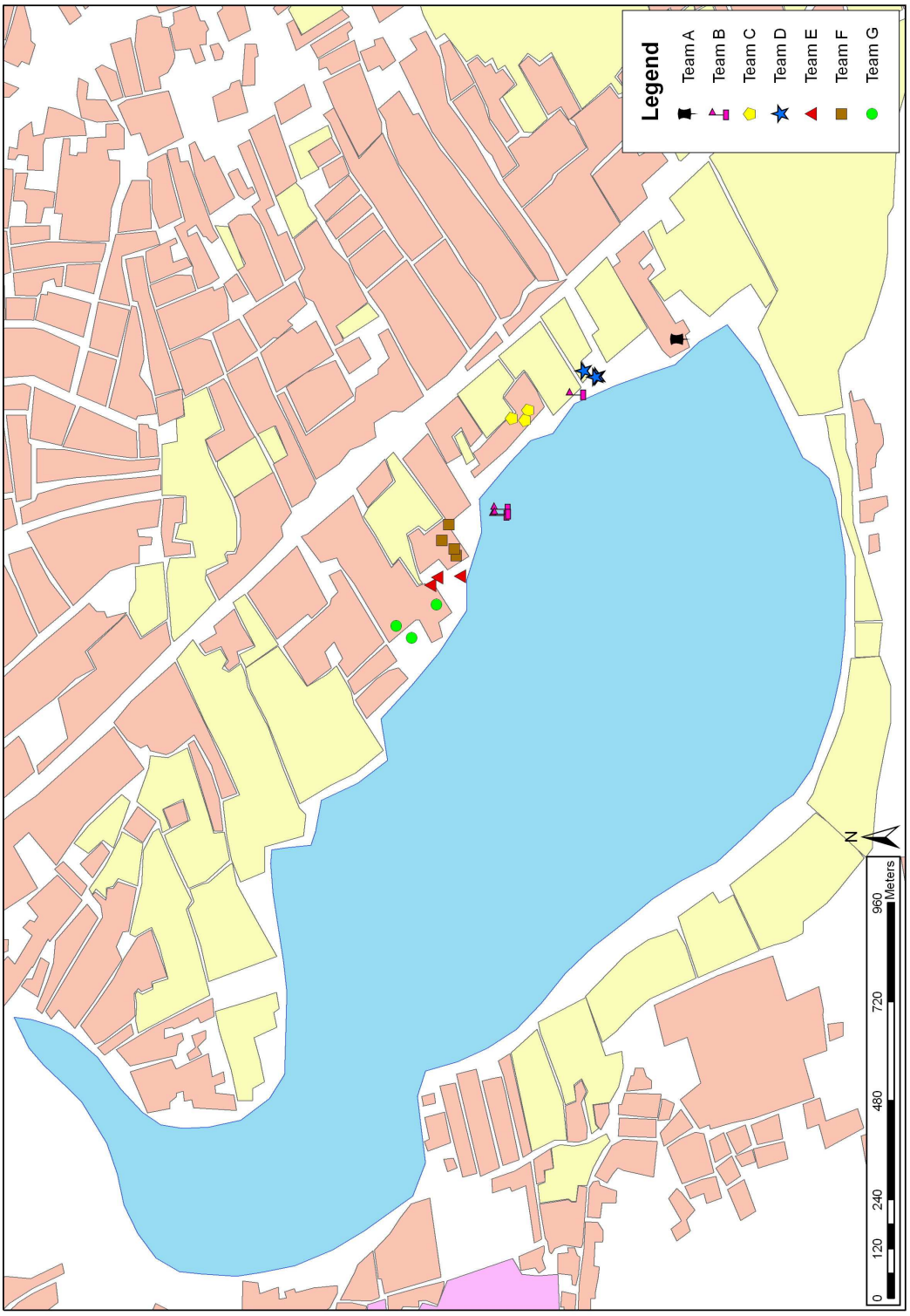

Figure 1. Topographic map of Kol-e-Hashmat Khan Lake in the southeastern outskirt of Kabul. The lake is represented in its maximal free-water surface, as it was in March 2007. Pink areas show dense housing zones. Locations of the interviews carried out on October 1, 2007 are represented for the six interviewing groups.

RESULTS

Results of the questionnaire are compiled in Table 1. Each team interviewed four different households, except one which interviewed five ($N_{tot}=29$). Nineteen households (65.5%) owned between 1 and 15 chickens at home, one also having a hundred of feral pigeons. Median number of chickens per household was two. Seven (36.8%) of the chicken owners reported health problems in their chickens, mainly Newcastle Disease as well as a variety of undiagnosed impairments. Only one (3.4%) respondent admitted still hunting while 16 (55.2%) mentioned that people used to hunt in the past in the area, referring either to royal hunting parties during Zahir Shah Monarchy or widespread hunting activities during Taliban rule. It is noteworthy that 18 (62.1%) respondents reported that 'other people' still hunt in the area. According to most of them such hunting activity target waterbirds and occur in spring and winter when there is free water in the lake. Hunting is practiced at night or in early morning mainly by people coming from Kabul. Main hunted species are ducks and coots. Only three people (10.3%) mentioned that they had found dead wild birds in the area in the past (ducks and coots in winter). Eventually all respondents mentioned that the lake dries out each year, between late summer/autumn and early winter. One person mentioned that during Zahir Shah Reign, water level was not fluctuating so markedly. All respondents confirmed that the lake is completely or partially frozen during winter.

DISCUSSION

Answers to questionnaires showed that: 1/ Poultries are present in the immediate vicinity of the lake; 2/ Some people still hunt in the area and may be in direct contact with wild birds; 3/ Waterfowl seem to be the most numerous between early winter and late spring when water is plentiful and free; 4/ Fewer waterbirds are to be expected during winter when the lake is frozen; 5/ Kol-e-Hashmat Khan is unlikely to constitute an environmental reservoir of avian influenza virus since it dries out at the end of each summer.

Chickens are present in small numbers in households in direct proximity of the wetland and it is possible that they may roam free in grasslands also used by wild waterfowls. Reports of preventable disease such as Newcastle Disease suggest that the general sanitary level and medical follow up of this poultry population is low, as it is common in many rural communities in the country.

Although all but one respondent reported that they do not hunt, they also admitted that they knew of other people hunting in the area. Given the hunting ban, it was obviously not easy to admit hunting and those 'other people' could as well be the interviewed people themselves.

A few people reported finding dead waterfowls, apparently in winter. During the harsh weather conditions of winter in Afghanistan, waterfowl may die of starvation if water freezes, or even of coldness. By no means do these reports suggest a mass-mortality event such as those recorded in H5N1 outbreaks. One of them for example killed more than 6000 birds in Qinghai Lake in China in spring 2005 (Chen et al. 2006).

Table 1. Questions and answers to interviewed carried out in 29 households by trainees of the WCS/FAO course on Avian Influenza surveillance in wild birds, October 1, 2007, Kol-e-Hashmat Khan Lake, Kabul, Afghanistan.

Interview No.	Do you have poultries at home?	Have you had sick poultries recently?	Do you hunt waterbirds?	Did you or other people hunt waterbirds?	Do people still hunt in the area?	Have you ever noticed dead water birds?	Does the lake dries-out sometime in the year?	Does water in Kol-e-Hashmat Khan freezes in winter?
1	1 chicken	No	No	No	Yes	No	Yes	Yes
2	12 chickens	No	No	Yes	-	1 duck	Yes	Yes
3	1 chicken	Yes	No	Yes	Yes	No	Yes	Yes
4	1 chicken	No	No	Yes	Yes	No	Yes	Yes
5	No	-	No	Yes	No	No	Yes	Yes
6	No	-	No	No	Yes	No	Yes	Yes
7	6 chickens	Yes	No	Yes	Yes	No	Yes	Yes
8	No	-	Yes	Yes	Yes	Yes	Yes	Yes
9	3 chickens	No	No	No	Yes	Ducks & coots	Yes	Yes
10	8 chickens	No	No	No	Yes	No	Yes	Yes
11	7 chickens	No	No	No	No	No	Yes	Yes
12	2 chickens	No	No	No	Yes	No	Yes	Yes
13	3 chicken + 100 pigeons	No	No	Yes	No	No	Yes	Yes
14	No	-	No	Yes	No	No	Yes	Yes
15	3 chickens	No	No	Yes	No	No	Yes	Yes
16	5 chickens	No	No	Yes	No	No	Yes	Yes
17	No	-	No	No	Yes	No	Yes	Yes
18	No	-	No	No	Yes	No	Yes	Yes
19	2 chickens	No	No	Yes	No	No	Yes	Yes
20	5 chickens	No	No	No	Yes	No	Yes	Yes
21	No	-	No	Yes	Yes	No	Yes	Yes
22	No	-	No	Yes	No	No	Yes	Yes
23	8 chickens	Yes	No	No	Yes	No	Yes	Yes
24	No	-	Yes	Yes	Yes	No	Yes	Yes
25	No	-	No	No	Yes	No	Yes	Yes
26	2 chickens	Yes	No	No	Yes	No	Yes	Yes
27	5 chickens	Yes	No	Yes	No	No	Yes	Yes
28	15 chickens	Yes	No	Yes	No	No	Yes	Yes
29	3 chickens	Yes	No	No	Yes	No	Yes	Yes

Respondents confirmed that Kol-e-Hashmat Khan dries out each summer and is restored after winter precipitations. This is an important observation as it presumably rules out this body of water as a potential reservoir of influenza viruses. Although studies on the persistence of avian influenza viruses in water are extremely limited (Stallknecht and Brown, 2007), there are indications that their survival is improved in cold, poorly saline waters, at pH neutral to mildly basic (7.0–8.5). The fact that Kol-e-Hashmat Khan is shallow and seldom receives inflow of water from rivers suggests that salinity may significantly increase in summer as well as water temperature (probably above 20°C). The virus would probably not survive in such environmental conditions nor endure waterless conditions of the end of summer. However, water contamination could happen and would probably peak between early winter and spring. Indeed contaminated birds may disseminate viruses in the cold water in late autumn (early December)/ early winter, the viruses would presumably survive in frozen water and re-disseminate in spring during thawing period putting spring migrating birds into jeopardy.

RECOMMENDATIONS

Acknowledging the presence of poultry in potential close contact with wild birds and in a context of encroaching urban environment and high human density, we recommend:

1. To extend the questionnaire survey to a larger proportion of the human community living around the lake.
2. To perform an active surveillance of waterfowls in the area in late autumn before water freezes and in spring after thawing, the two most critical periods in term of avian influenza virus occurrence or emergence in the area.
3. To ask local guards to report immediately to the Ministry of Agriculture and the FAO about any case of waterfowl mortality in the area, even if it is second-hand information.
4. To monitor water level, water temperature, salinity and pH throughout the year to evaluate the risk of viral persistence in the lake.

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APPENDIX I – LIST OF PARTICIPANTS TO THE INVESTIGATION

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