

RESPONSE OF WILD GOATS TO HUMAN DISTURBANCE NEAR A WATERPOINT IN KIRTHAR NATIONAL PARK, PAKISTAN¹

W. DANIEL EDGE², SALLY L. OLSON-EDGE² AND NASIR GHANI³

The response of wild goats (*Capra aegagrus*) at a waterpoint to construction of a well 600 m away was observed from March through May, 1986. The well was constructed between 0900 and 1800 h in April and May. Groups of goats that drank from the waterpoint were 51%, 34% and 71% of all groups that approached the waterpoint during March (n=35), April (n=71), and May (n=48) respectively. The number of goats drinking per month increased from 344 in March to 730 in May. During March, 97% of the goats visited the waterpoint between 0900 and 1800 h. However, during the construction in April and May, only 51% of the visits occurred during this time period; the other 49% visited either earlier or later in the day. Construction activities at such sites should be timed to avoid the pre-monsoon season during which goats are dependent upon the water.

INTRODUCTION

The wild goat, locally known as the Sind Ibex, is the most abundant large mammal in Kirthar National Park, Pakistan, and is the dominant native ungulate in many of the hill ranges throughout Sind and Baluchistan. With the exception of brief studies by Roberts (1967), Schaller and Laurie (1974) and Schaller (1977), little is known about the ecology of the wild goat in Pakistan. During a study of the biology and behaviour of wild goats and urial (*Ovis orientalis*) at a waterpoint in Kirthar National Park, Edge *et al.* (in press) reported that less than half of the wild goat groups (\bar{x} group size 18.8) that approached the waterpoint actually drank. In this paper we report the response of wild goats to construction activities at a nearby well.

STUDY AREA AND METHODS

Kirthar National Park lies approximately 150 km northeast of Karachi, Pakistan, between latitudes 25° and 26°N. The park is bordered on the east by the Surjan, Sumbak and Hothiano Game Reserves and on the west by the border with Baluchistan. The mean maximum and mean minimum temperatures from March through May were 38°C and 27°C respectively. No weather station was maintained in the park, but local residents reported that there was very little rainfall in 1984 and 1985. The 3,087 km² area encompassed our core study area, the Karchat Hills, of which Schaller and Laurie (1974) gave a detailed description. The Janko waterpoint, where our observations were made, was previously described by Edge *et al.* (in press).

A well, 600 m south of the Janko waterpoint, was constructed during April and May, 1986. A crew of four to six men worked on the well between 0900 h and 1800 h four or five days a week during the two months. The well is visible from a ridge overlooking the waterpoint.

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² Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT 59812 U.S.A. Present address: Conservation and Research Center, National Zoological Park, Smithsonian Institution, Front Royal, VA 22630, U.S.A.

³ Zoological Survey Department, Block 61, Pakistan Secretariat, Sharah-e-Iraq, Karachi, Pakistan.

Wild goats were observed with 10x binoculars or a 15-35 x telescope between the hours of dawn and dusk from a blind 66 m from the waterpoint. From March to May, 1986 we captured wild goats with a remotely-fired net-gun aimed at the waterpoint, or with Aldridge leg-hold snares placed around the waterpoint. Captured animals were marked for individual identification with colour-coded and numbered plastic ear-tags.

RESULTS

We watched the Janko waterpoint a total of 416 h, over 32 days, between 21 March and 21 May, 1986. During this period we captured and marked 34 wild goats (26 females and 8 males) — 24 with the net-gun and 10 in snares. One hundred and fifty-three groups of wild goats approached the waterpoint during our observation but only 49% of these groups actually drank. The number of groups that drank from the waterpoint was related to month ($X^2 = 15.3$, $df = 2$, $P < 0.01$). In March, 51% of the groups drank, compared to 34% in April, and 71% in May. The percentage of groups that drank only during construction hours decreased from 83% in March, when there was no construction, to 59% in May (Table 1). However, the time of

visit for groups was not related to month ($X^2 = 3.43$, $df = 2$, $P > 0.1$).

The number of individual wild goats that drank from the waterpoint increased from 344 in March to 730 in May (Table 2). The time of visit for these animals was related to month ($X^2 = 236$, $df = 2$, $P < 0.01$), with 97% of the visits in March occurring between 0900 and 1800 h. However, during April and May, only 51% of the visits occurred during this time period.

TABLE 2

NUMBER (AND PERCENTAGE) OF INDIVIDUAL WILD GOATS DRINKING FROM THE JANKO WATERPOINT BY MONTH DURING 0900-1800 H AND BEFORE OR AFTER CONSTRUCTION PERIODS, 1986

Time of visit	Month		
	March ¹	April	May
0900 to 1800 h	333 (97)	251 (51)	375 (51)
Before 0900 h or after 1800 h	11 (3)	243 (49)	355 (49)

¹ No construction occurred during March.

DISCUSSION

Wild goats responded to construction of a well, 600 m from the Janko waterpoint, by a shift in drinking periods. With the onset of construction in April, the percentage of groups that drank from the waterpoint decreased. This decrease in drinking success was accompanied by a shift in drinking time; individual goats that drank predominantly between 0900 and 1800 h in March, shifted much of their drinking activity to outside these hours in April. During May, 49% of all individual wild goats that drank did so either before or after construction periods; this was accompanied by a marked increase in the percentage of groups

TABLE 1

NUMBER (AND PERCENTAGE) OF WILD GOAT GROUPS DRINKING FROM THE JANKO WATERPOINT BY MONTH DURING (0900-1800 H), AND BEFORE OR AFTER CONSTRUCTION PERIODS, 1986

Time of visit	Month		
	March ¹	April	May
0900 to 1800 h	15 (83)	17 (71)	20 (59)
Before 0900 h or after 1800 h	3 (17)	7 (29)	14 (41)

¹ No construction occurred during March.

that drank. Jorgensen (1974) and Campbell & Remington (1981) reported that desert bighorn sheep (*Ovis canadensis*) modified their drinking patterns in a similar manner to avoid human disturbance.

One could argue that the partial shift in water-use patterns to early morning and late evening periods, during April and May, may correspond to increasing temperatures. However, local game watchers and wildlife enthusiasts reported that the water-use patterns we observed during March were the normal patterns for April and May. In addition, wild goats that approached the waterpoint during construction periods did so cautiously, constantly looking in the direction of the well.

Kirthar National Park is a remote area and receives very little visitor use. In addition, the park staff is not adequately equipped to prevent poaching in the park. Flight distance of wild goats from people on foot in the park often exceeded 1 km (Edge & Olson-Edge, unpubl. data). Goats within the park responded to human presence in a manner similar to wild populations outside the park and have not become habituated to humans. Wild goats at the Janko waterpoint did not show a complete shift in water-use activity, probably because the disturbance was 600 m away, and because the waterpoint was the only source of water available to them. Had the construction been at or closer to the waterpoint, we believe a complete shift in water-use patterns would have been observed.

Our trapping activities at the waterpoint undoubtedly caused some disturbance. How-

ever, the disturbance was minor and could not account for the shift in water-use patterns we observed. We trapped throughout the day and developed a conservative trapping program to reduce the possibility of disturbance. We rarely trapped more than three consecutive days a week, and used the net-gun to capture wild goats only when the group size was less than 20. We relied on snares to capture wild goats when the groups were greater than 20, and we did not approach the captive goat until the entire group drank and walked away. Nevertheless, managers should be aware of the potential disturbance that can be caused by trapping at water sources (Leslie & Douglas 1979).

The results of this study indicate that wild goats will be sensitive to human disturbance at or near water sources. Construction projects and other human activities at or adjacent to water sources should be carefully evaluated for their potential effects on wild goat populations. Construction activities at such sites should be timed to avoid the pre-monsoon season during which wild goats are dependent upon the water.

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