

fall, as antelope are preparing for the harsh winter.

The Tibetan Plateau has extensive gold deposits. Gold mining can have significant impacts on chiru habitat and lead to increased poaching. Mining degrades or destroys chiru habitat through environmental contamination and disturbance, and through pollution of surface waters [U.S. Embassy, China (USEC) 1996]. Illegal mining activity also opens another avenue for profiting from poaching (USEC 1996). Bleisch (1999) noted that illegal gold mining camps in the Arjin Shan Reserve in Xinjiang have served as bases for poachers and have provided them with essential logistical support and access. Without this support, poachers would have a difficult time operating in these remote regions. As a result, "poaching has already had a profound impact on the chiru population of the reserve. Several areas where calving females formerly congregated are now empty of chiru during the calving season" (Bleisch 1999). In 2002, Rick Ridgeway and Galen Rowell spent 2 weeks on foot locating an unknown calving ground in the western Chang Tang only to discover that its location was less than 2 days' overland drive from a new gold mine that had sprung up in the previous few months (Ridgeway 2003). They wrote:

That same dirt road [a 60-mile dirt road built by miners in the previous 3 months] gives us an easy way home, as we cart toward our waiting vehicle. But it could also give poachers easy access to the calving grounds. From the mine we estimate a four-wheel-drive vehicle could make it cross-country in 2 days.... With the chiru's calving grounds suddenly vulnerable, we feel a new urgency to report our findings.

Governments may periodically enforce mining bans in sensitive areas, and have done so in Tibet, but in general it is difficult to control illegal miners over extensive areas of remote lands with poor road access. Tibet has reserves of many other valuable minerals, among them uranium, copper, and cesium, and mining of these minerals may also impact chiru habitat and lead to poaching.

Oil exploration and some production have commenced within the chiru's range, and pose threats of destroying habitat; polluting the environment with toxic production chemicals, effluents, and emissions; increasing disturbance levels; and increasing the incidence of poaching by drawing additional settlers into the region (Ginsberg *et al.* 1999). In 2001, Chinese researchers announced the discovery of a potentially huge oil and gas deposit, extending over 100 km in length, in the Qiangtang Basin of the

Tibet Autonomous Region (Global Policy Forum 2001). The deposit could potentially produce hundreds of millions of tons of oil.

Construction of the Qinghai-Tibet Railway, currently in progress, threatens to destroy important Tibetan antelope habitat, and, perhaps more importantly, significantly disrupt chiru migration corridors in southwestern Qinghai Province. One news service report mentioned that construction on the railway, the first to link the Tibet Autonomous Region with the rest of China, was temporarily suspended in June 2002 because up to 1,000 migrating chiru were unable to cross the construction area (People's Daily 2002, Xinhuanet 2002a). All activity was stopped and construction workers removed from the area until these animals had passed the construction site. Although the news service report mentioned that "a passage specially for animals will be set aside when the railway is built, so as to ensure the free migration for wildlife in the locality," it is not certain how successful such a passage would be in ensuring freedom of movement for thousands of migrating chiru.

Three contiguous protected areas have been established to protect Tibetan antelope populations and habitat in western China: Chang Tang Nature Reserve (approximately 334,000 km<sup>2</sup> in the Tibet Autonomous Region), Kekexili (aka Kokoxili or Hoh Xil) National Reserve (approximately 45,000 km<sup>2</sup> in Qinghai Province), and Arjin Shan Reserve (45,000 km<sup>2</sup> in Xinjiang Province). A fourth protected area, Xianza Reserve (40,000 km<sup>2</sup> in the Tibet Autonomous Region), also includes some chiru habitat. These reserves are only partially effective in protecting the chiru and its habitat due to a combination of inadequate management, limited enforcement capacity, an influx of settlers, and domestic livestock grazing [International Fund for Animal Welfare/Wildlife Trust of India (IFAW/WTI) 2001]. Miller (1997) has noted that, while many of the protected areas in the Tibetan Plateau region encompass high-elevation rangelands, protected areas at lower grassland elevations are scarce. It has been difficult for reserve staffs to keep poachers and illegal gold miners out, a fact that prompted the Qinghai Provincial Government in late 1999 to close the Kekexili Reserve to all activities that were not expressly authorized in advance by the State Forestry Administration (SFA) (China Daily 1999).

The Chang Tang Reserve staff lacks the funding, experience, personnel, and equipment to adequately prevent chiru

poaching and other threats to the species (SFA 1998). Formerly nomadic pastoralists are establishing settlements within the Chang Tang Reserve, and immigrants from other parts of the Plateau are moving into protected areas. Increased human presence, whether temporary nomadic aggregations or permanent human settlements, can adversely affect Tibetan antelope habitat and be a detrimental disturbance factor.

#### *B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes*

There are no accurate estimates of Tibetan antelope numbers from the past, although the few early western explorers who ventured onto the Tibetan Plateau noted the presence of large herds in many areas (Schaller 1998). For example, Rawling (1905, cited in Schaller 1998) noted: "Almost from my feet away to the north and east, as far as the eye could reach, were thousands upon thousands of doe antelope with their young \* \* \*. Everyone in camp turned out to see this beautiful sight, and tried, with varying results, to estimate the number of animals in view. This was found very difficult \* \* \* as we could see in the extreme distance a continuous stream of fresh herds steadily approaching; there could not have been less than 15,000 or 20,000 visible at one time." Bonvalot (1892), Wellby (1898), Deasy (1901), and Hedin (1903, 1922) made similar observations (all references cited in Schaller 1998). Schaller (1999) has suggested that upwards of 1 million Tibetan antelope roamed the Tibetan Plateau as recently as 40 to 50 years ago. Historical population estimates of 500,000 to 1,000,000 appear to be reasonable based on the limited information available.

Although data on the current population dynamics of chiru are fragmentary and preliminary (Schaller 1998), it is clear that the total population has declined drastically in the past 30 years and is continuing to decline at an alarming rate. Schaller (1998) estimated that the total population in the mid-1990s may have been as low as 65,000–75,000 individuals. More recent estimates from China quote a population figure of 70,000, although the scientific basis for the estimate is not given (Xinhuanet 2002b). If one assumes that the historical population of chiru was 500,000 individuals (an apparently conservative estimate), then the most recent estimate of 70,000 represents a population decline of greater than 85 percent.