

## = Tamaraw =

The tamaraw or Mindoro dwarf buffalo ( *Bubalus mindorensis* ) is a small , hoofed mammal belonging to the family Bovidae . It is endemic to the island of Mindoro in the Philippines , and is the only endemic Philippine bovine . It is believed , however , to have once also thrived on the larger island of Luzon . The tamaraw was originally found all over Mindoro , from sea level up to the mountains ( 2000 meters above sea level ) , but because of human habitation , hunting , and logging , it is now restricted to only a few remote grassy plains and is now an endangered species .

Contrary to common belief and past classification , the tamaraw is not a subspecies of the local carabao , which is only slightly larger , or the common water buffalo . In contrast to the carabao , it has a number of distinguishing characteristics : it is slightly hairier , has light markings on its face , is not gregarious , and has shorter horns that are somewhat V @-@ shaped . It is the largest native terrestrial mammal in the country .

## = = Anatomy and morphology = =

*Bubalus mindorensis* has the appearance of a typical member of its family . It has a compact , heavysset , bovine body , four legs that end in cloven hooves and a small , horned head at the end of a short neck . It is smaller and stockier compared to the water buffalo ( *Bubalus bubalis* ) . There is little sexual dimorphism in the species although males are reported to have thicker necks . The tamaraw has an average shoulder height of 100 ? 105 cm ( 39 ? 41 in ) . The length of the body is 2 @.@ 2 m ( 7 @.@ 2 ft ) while the tail adds a further 60 cm ( 24 in ) . Reported weights have ranged from 180 to 300 kg ( 400 to 660 lb ) .

Adults have a dark brown to grayish color and more hair than *Bubalus bubalis* . The limbs are short and stocky . White markings are seen in the hooves and the inner lower forelegs . These markings are similar to that of the anoa ( *Bubalus depressicornis* ) . The face is the same color as that of the body . Most of the members of the species also have a pair of gray @-@ white strips that begins from the inner corner of the eye to the horns . The nose and lips have black skin . The ears are 13 @.@ 5 centimetres ( 5 @.@ 3 in ) long from notch to tip with white markings on the insides .

Both sexes grows short black horns in a V @-@ shaped manner compared to C @-@ shaped horns of *Bubalus bubalis* . The horns have flat surfaces and are triangular at their base . Due to the regular rubbing , the tamaraw 's horns have a worn outer surface but with rough inner sides . The horns are reported to be 35 @.@ 5 to 51 centimetres ( 14 @.@ 0 to 20 @.@ 1 in ) long .

## = = Distribution = =

The tamaraw was first documented in 1888 on the island of Mindoro . Before 1900 , most people avoided settling on Mindoro due to a virulent strain of malaria . However , as anti @-@ malarial medicine was developed , more people settled on the island . The increase in human activity has drastically reduced tamaraw population . By 1966 the tamaraw 's range was reduced to three areas : Mount Iglit , Mount Calavite and areas near the Sablayan Penal Settlement . By 2000 , their range was further reduced to only two areas : the Mounts Iglit ? Baco National Park and Aruyan .

Initial estimates of the *Bubalus mindorensis* population on Mindoro was placed at around 10 @,@ 000 individuals in the early 1900s . Less than fifty years later in 1949 , the population had dwindled to around a thousand individuals . By 1953 , fewer than 250 animals were estimated to be alive . These population estimates continually grew smaller until the IUCN publication of their 1969 Red Data Book , where the tamaraw population was noted to be an alarmingly low 100 heads . This head count rose to 120 animals in 1975 . Current estimates place the wild tamaraw population from thirty to two hundred individuals .

## = = Ecology and life history = =

As a rare , endemic mammal on a relatively secluded island , the ecology of the tamaraw is largely

unknown . Individuals of the species are reclusive and shy away from humans . In addition , the small sizes of the species ' subpopulations , already spread thin throughout their fragmented range ( on 1986 , about 51 individuals are found in a 20 square kilometer area ) , make contact with any more than a solitary individual a rarity .

= = = Habitat = = =

*Bubalus mindorensis* prefers tropical highland forested areas . It is typically found in thick brush , near open @-@ canopied glades where it may graze and feed on grasses . Since human habitation and subsequent forest fragmentation of their home island of Mindoro , the habitat preferences of the tamaraw have somewhat expanded to lower @-@ altitude grassy plains . Within their mountainous environment , tamaraws will usually be found not far from sources of water . They have to live by water so they can drink . They live in moist areas such as , marshy areas , and grasslands .

= = = Trophic ecology = = =

The tamaraw is a grazer that feeds on grasses and young bamboo shoots although it is known to prefer cogon grass and wild sugarcane ( *Saccharum spontaneum* ) . They are naturally diurnal , feeding during the daytime hours ; however , daytime human activities have recently forced select *B. mindorensis* individuals to be nocturnal to avoid human contact .

= = = Life history = = =

The tamaraw is known to live for about 20 years , with an estimated lifespan of about 25 . The adult female tamaraw gives birth to one offspring after a gestation period of about 300 days . There is an interbirth interval of two years , although one female has been sighted with three juveniles . The calf stays for 2 ? 4 years with its mother before becoming independent .

= = Behavioral ecology = =

Unlike the closely related water buffalo , *B. mindorensis* is a solitary creature . Adults of the species do not occur in herds or smaller packs and are often encountered alone . Only juveniles exhibit the typical bovine herding behavior and clan hierarchy often seen in water buffalo . Males and females are known to associate all year round but this interaction lasts only a few hours . It has been suggested that this solitary behavior is an adaptation to its forest environment . Adult males are often solitary and apparently aggressive while adult females can be alone , accompanied by a bull , or three young of different ages .

Similar to other bovines , the tamaraw wallows in mud pits . It has been suggested that this behavior is employed by the animals in order to avoid biting insects .

Another distinct behavior in *B. mindorensis* is their fierceness . There are reports concerning their fierceness when cornered although most are unsubstantiated . Threat posture used by the bovine involves lowering of the head , shifting its horns into a vertical position . This is accompanied with a lateral shaking of the head .

= = Evolutionary history = =

The presence of *B. mindorensis* on the island of Mindoro , coupled with the discovery of fossil bubalids in other islands around the archipelago indicates that the family was once widespread throughout the Philippines . In fact , fossil finds in the 20th century have shown that *B. mindorensis* were once found on the northern Philippine island of Luzon during the Pleistocene .

As a member of the family Bovidae , the tamaraw 's close affinity to the water buffalo ( *Bubalus bubalis* ) has been validated many times in the past . It was once considered a subspecies of *B. bubalis* ( as *Anoa bubalis* ) , *Anoa bubalis mindorensis* . Recent genetic analysis studies of the

family members further strengthen this view .

#### = = Etymology and taxonomic history = =

The tamaraw was originally described as *Anoa mindorensis* by the French zoologist Pierre Marie Heude in 1888 . In 1958 , it was described as *Anoa bubalis mindorensis* , a subspecies of the then @-@ water buffalo species ( *Anoa bubalis* ) . A little over a decade after , the tamaraw was elevated to species status as *Anoa mindorensis* in 1969 .

Later research and analyses of relationships determined the genus *Anoa* to be a part of the genus *Bubalus* . The tamaraw 's scientific name was updated into its present form , *Bubalus mindorensis* ( sometimes referred to as *Bubalus* ( *Bubalus* ) *mindorensis* ) .

The name tamaraw has other variants like tamarau , tamarou and tamarao . It has been suggested that the term tamaraw came from tamadaw which is a probable alternative name for the banteng ( *Bos javanicus* ) .

#### = = Conservation = =

Being an entirely endemic and rare land mammal , *Bubalus mindorensis* stands as an extremely vulnerable species . Currently , it is classified as a critically endangered species and has been so since 2000 by the IUCN on its IUCN Red List of endangered species . Awareness of the conservation status of *Bubalus mindorensis* began way back in 1965 when it was classified as Status inadequately known by the IUCN . Enough data was gathered on the tamaraw population by 1986 , and the IUCN conservation monitoring center declared the species endangered . Throughout succeeding surveys conducted in 1988 , 1990 , 1994 and 1996 , the species remained listed on the Red List as endangered . The relisting of the species in 1996 fulfilled the IUCN criteria B1 + 2c and D1 . Criterion B1 indicated that the species ' range was less than 500 square kilometers and is known to exist in less than five independent locations . A noticed continuing decline in the population fulfilled sub @-@ criterion 2c , given the condition of the population 's sole habitat . Criterion D1 essentially required that a population be composed of less than 250 mature individuals ; individual counts of the *B. mindorensis* population at the time figured significantly lower than this . In 2000 , the tamaraw was relisted on the Red List under the more severe C1 criteria . This was due to estimates that the population would decline by 20 % in five years or within the timespan of two generations .

Many factors have contributed to the decline of the tamaraw population . Over the course of the century , the increase of the human population on Mindoro has exposed the island 's sole tamaraw population to severe anthropogenic pressures . In the 1930s , the introduction of non @-@ native cattle on the island caused a severe rinderpest epidemic among the tamaraw population then @-@ numbering in the thousands . Hunting of tamaraws for food and sustenance has also taken a toll on the species ' numbers . The most major factor threatening survival of *B. mindorensis* is habitat loss due to infrastructure development , logging and agriculture . These factors reduced the population of thousands during the early 1900s to less than 300 individuals in 2007 .

Due to the decline of the *B. mindorensis* population , various Philippine laws and organizations have been created towards the conservation of the species . In 1936 , Commonwealth Act No. 73 was enacted by the then @-@ Philippine Commonwealth . The act specifically prohibited killing , hunting and even merely wounding tamaraws , with an exception noted for self @-@ defense ( if one were to be attacked by an agitated individual ) or for scientific purposes . The penalties were harsh enough to include a hefty fine and imprisonment .

In 1979 , an executive order was signed creating a committee specifically geared towards the conservation of the tamaraw . The tamaraw was referred to as a " source of national pride " in the said E.O. The Tamaraw Conservation Project was also established in 1979 . The organization has successfully bred a tamaraw , nicknamed " Kali " , in captivity in 1999 . In 2001 , Republic Act 9147 , or the Wildlife Resources Conservation and Protection Act was enacted to protect the tamaraw and other endemic species from hunting and sale . During the 1970s , a gene pool was established to

preserve the tamaraw 's numbers . However , the project was not successful as only one offspring , named " Kali " , was produced . As of 2011 , Kali is the only surviving animal in the gene pooling project . The project was also not improved as the Protected Areas and Wildlife Bureau shown that the tamaraws were already breeding in the wild . Cloning was not implemented for conservation as the Department of Environment and Natural Resource argued that such measures would diminish the genetic diversity of the species .

A small subpopulation of tamaraw has been found within the confines of the Mt . Iglit Game Refuge and Bird Sanctuary on the same island of Mindoro .

As of May 2007 , *Bubalus mindorensis* is on Appendix I of the Convention on International Trade in Endangered Species where it has been since the species was first put on the list on January 7 , 1975 . With the listing , CITES recognizes the species as critically endangered and threatened with extinction . Thus , international commercial trade in the species or any derivatives of which , such as the meat , horns or flesh is considered illegal . While commercial trade in the species is prohibited , exchange for non @-@ commercial reasons such as scientific research is allowed .

In October 2008 , the Department of Agriculture 's Philippine Carabao Center ( DA @-@ PCC ) director , Dr. Arnel del Barrio , officially reported that the tamaraw population had increased yearly by an average of 10 % from 2001 to 2008 . The April 2008 tamaraw expedition reports of the Tamaraw Conservation Program ( Mt . Iglit @-@ Baco National Park in Mindoro Occidental ) , by government and private entities , including Far Eastern University ( FEU ) students , revealed that " the tamaraw population was counted at 263 this year compared to only 175 heads in 2001 . The calving rate estimated by number of yearlings is considerably high ... ( which could mean that ) more than 55 % of the tamaraws are giving birth . In Mount Iglit @-@ Baco National Park , the official count of the animal was 263 in 2006 , 239 in 2007 and 263 in 2008 . " Mindoro 's indigenous Mangyan people have stopped slaughtering the animal for its blood .

The Haribon Foundation called the animal " Mindoro ? s endangered treasure " and later " the Philippines ? endangered flagship species " until 2005 . In the 1930s the tamaraw population declined due to rinderpest , a viral disease affecting cattle . In the 1960s and 1970s , hunters killed tamaraws for sport . More importantly , the rampant deforestation ( from 80 % habitat forest cover in the 1900s down to 8 % in 1988 ) in the area hastened the animal 's decline .

The Bangkok , Thailand International Union for the Conservation of Species ( IUCS ) has established a 280 @-@ hectare gene pool farm in Rizal , Mindoro Occidental . Also , extensive reforestation was implemented to hasten the tamaraws ' propagation . The animals are now found only in the mountainous portions of Mt . Iglit @-@ Baco National Park , Mt . Calavite , Mt . Halcon @-@ Eagle Pass , Mt . Aruyan @-@ Sablayan @-@ Mapalad Valley , and Mt . Bansud @-@ Bongabong @-@ Mansalay .

The 2002 Presidential Proclamation 273 set October as a " Special Month for the Conservation and Protection of the Tamaraw in Mindoro . " . At least 90 % belong to Mount Iglit @-@ Baco . To this day there are about 100 left . They 're becoming extinct because of humans .

= = Importance to humans = =

= = = Economical and commercial value = = =

While not as heavily exploited as other large , endangered mammals , the tamaraw population on Mindoro was subject to some harvesting pressure from subsistence hunters before conservation efforts were spurred towards the latter half of the 20th century . The IUCN has described this as still ongoing in their 2006 Red List report .

= = = In Philippine culture = = =

Though the national animal of the Philippines is the carabao , the tamaraw is also considered a national symbol of the Philippines . An image of the animal is found on the 1980 @-@ to @-@ early

@-@ 1990 version of the one @-@ Peso coins .

In 2004 , Proclamation No. 692 was enacted to make October 1 a special working holiday in the province of Occidental Mindoro . In line with the Tamaraw Conservation Month , the proclamation aimed to remind the people of Mindoro the importance of the conservation of the tamaraw and its environment .

In the 1970s Toyota Motors , through the defunct local company Delta Motors , built the Tamaraw AUV ( Asian Utility Vehicle ) . Because of its ruggedness and simplicity of design , some examples still survive to this day , copied by multinational companies Ford , General Motors , and Nissan , through local subsidiary manufacturers to this day . Because it is an Asian Utility Vehicle , it shares its design with the Kijang , the Indonesian version . Automobile maker Toyota once held a franchise in the Philippine Basketball Association , naming its team the Toyota Tamaraws ( see below ) .

During the wake of the Asian utility popularity in the 1990s , Toyota Motors Philippines released an Asian Utility Vehicle ) called Tamaraw FX in the Philippines , an evolution of the Tamaraw AUV . It was widely patronized by taxi operators and was immediately turned into a staple mode of transportation much like a cross of the taxi and the jeepney . The FX eventually evolved into the Revo .

The tamaraw is also the mascot of the varsity teams of the Far Eastern University ( FEU Tamaraws ) in the University Athletic Association of the Philippines , and of the Toyota Tamaraws of the Philippine Basketball Association .

The Tamaraw Falls in Barangay Villaflor , Puerto Galera were also named after the bovine .