



Protecting primates and habitats worldwide

## The Amazing World of The Barbary Macaque



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# 1. Introduction

## 1.1 Taxonomy

Macaques belong to the genus *Macaca*, part of the family Cercopithecidae (Maestriperi, 1997; Modolo et al., 2005). They are one of the most successful primates in the world (Redmond, 2010): the genus includes 19 extant species covering the largest geographical range of any other nonhuman primate (Redmond, 2010).

Macaque species, classified as Old World monkeys, are mainly distributed in southern and northern Asia as well as in limited areas of western North Africa (Maestriperi, 1997; Lavieren, 2004; Bayne, 2005; Modolo et al., 2005).

## 1.2 Geographical range

The Barbary macaques, once widespread in parts of Europe and all over North Africa, from Egypt to Morocco, are now only found in fragmented areas of the Rif and the Middle and High Atlas mountains in Morocco and parts of the Tellian Atlas in Algeria, and a small population on the Upper Rock of Gibraltar (Lavieren, 2012; Lavieren, 2004; Butynski et al., 2008; Waters and El-Harrad, 2013; Ciani et al., 2005; Lavieren and Wich, 2009; Alami et al., 2013).

Barbary macaques are distributed at altitudes ranging between 400 and 2300 meters (Lavieren, 2012; Butynski et al., 2008). In the winter the temperature can drop to below 0°C and in the summer it can rise up to 40°C. Therefore they are adapted to survive in extreme conditions.

They inhabit cedar and oak forests, grassland, scrub and rocky ridges (Lavieren, 2012).

Approximately 65-75 % of the wild population lives in the cedar forests of the Middle Atlas mountains in Morocco, therefore this area plays a fundamental role in their survival (Ciani et al., 2005; Alami et al., 2013).



■ Current Barbary macaque range

## 1.3 Why Unique?

Various facts make this primate species unique. It is the only primate species living in the north area of the Sahara desert in Africa (Lavieren, 2012; Ciani et al., 2005; Butynski et al., 2008). It is also the only species of the genus “*Macaca*” found outside of Asia (Lavieren, 2012; Butynski et al., 2008). And it is the only primate species that is present on European soil (Lavieren, 2012; Butynski et al., 2008).

Although there are three main captive populations of Barbary macaques in France and Germany, the only long established European population is the semi wild colony found in Gibraltar (Modolo et al., 2005). The origin of this European colony is unclear; some sources declare that the colony was the remnant of a wild European population, while others suggest that the macaques were imported between 711 and 1494 A.D (Modolo et al., 2005). The first written evidence of Barbary macaques on Gibraltar dates from 1704 (Modolo et al., 2005). Artificial intervention was applied for maintaining stable numbers of individuals in Gibraltar, by removing individual animals or restocking with importations of wild macaques from Morocco and Algeria (Modolo et al., 2005). In fact, a recent study of mtDNA variation in the existing Gibraltar population indicated that this population includes individuals of both Moroccan and Algerian ancestry (Modolo et al., 2005).

## 2. Morphological Characteristics of the Barbary Macaque

Barbary macaques have some morphological characteristics that distinguish them from other macaque species, including the absence of a tail and the presence of a nasal groove (MPC, 2012). The lack of a tail is a physical adaptation to their quadrupedal locomotion.



Figure 2. Monkeys of Morocco (Mingorance, 2014)

Generally they are very stocky, muscular primates, with bare rump pads on their rears called ischial callosities (Bayne, 2005; Fooden, 2007). They have no hair on their faces and yellowish grey and brown fur on their bodies and paler colours on their stomach (MPC, 2012); the hair colour darkens with time and season (MPC, 2012). Their thick coat insulates them from the extreme conditions of the Atlas Mountains (Fooden, 2007). A physical adaptation to the extreme seasonal shifts in temperatures is the moulting of the fur.

Barbary macaques have cheek pouches which extend down both sides of the neck and are used for storing food. The pouches are very useful if the monkeys are disturbed by predators while looking for food on the ground (Fooden, 2007). They also possess a fully opposable thumb that gives them the ability to manipulate objects with great precision (Bayne, 2005).

Their dental formula is the same as humans consisting of 4 incisors, 2 canines, 4 premolars and 6 molars on the maxilla and the same on the mandible. The species shows considerable sexual dimorphism with males being much larger than the females (MPC, 2012) and males possess larger canines than females. The enhanced canines are the result of living in a strict competitive dominance hierarchy (Fooden, 2007).



### 3. Diet of the Barbary Macaque

Barbary macaques are omnivorous (MPC, 2012) and they have a varied diet consisting of plants, fruits, seeds, fungi, invertebrates, lizards and agricultural crops (Young et al., 2012; MPC, 2012). Studies in Morocco have shown that Barbary macaques have a dietary range of 100-195 known plants (Fooden, 2007).



Figure 3. A young adult male Barbary Macaque monkey. The macaque is sitting in sunlight and using its hand to put grass into its mouth (Astbury)

Their diet varies with season, environment and resources. In the spring and winter they are mainly folivorous, eating leaves, shrubs and trees. In the summer and autumn they feed prevalently on fruit and berries. This wide variety of feeding habits explains their great capacity to survive in habitats affected by seasonal fluctuations in the quantity and quality of food available (MPC, 2012).

In the wild the opportunistic consumption of invertebrates has been observed, such as ants, scorpions and earthworms, but not the capture and consumption of birds and mammals. However, in semi-free ranging conditions, the capture and consumption of birds or their eggs, young rabbits and squirrels, has been documented, indicating that Macaques can feed on novel food when opportunities arise. This flexibility in feeding behaviour may have positive consequences for their future survival and can be very adaptive, allowing these primates to inhabit different areas depending upon the abundance of food (Young et al., 2012).



Figure 4. Barbary macaque licking dew from a young Atlantic cedar (Ferrero)

## 4. Social System and Behaviour

Barbary macaques live in a multi-male, multi-female group (Modolo et al., 2005; Widdig et al., 2000) with males migrating from their natal group (Widdig et al., 2000; Bayne, 2005; Konecna et al., 2012; Maestriperi, 1997). Macaques groups are therefore composed of clusters of related adult females with their offspring (matrilines) and unrelated adult males (Maestriperi, 1997).

Groups can contain up to 80 individuals, however, the average group size is around 40 individuals living in a highly promiscuous mating system (Modolo et al., 2005; MPC, 2012).

The group size tends to be smaller when the home range size is also smaller, for example when constrained by human activities (Bayne, 2005).



Figure 5. Barbary macaque troop Morocco (Ruoso, 2012)

All the individuals within a group are ranked along a linear dominance hierarchy, with adult males usually outranking females (Maestriperi, 1997; Bayne, 2005). Higher ranking animals are more successful in breeding and have first access to food and other resources (Bayne, 2005). Related females occupy adjacent ranks and daughters rank below their mothers (Maestriperi, 1997). Often, it is the rank of the mother, rather than the father, that determines the rank of the offspring (Bayne, 2005). Dominance ranking results from fights between individuals and are strongly affected by agonistic support provided by kin (Maestriperi, 1997). Support amongst kin is accompanied by frequent interactions consisting of contact, proximity and grooming (Maestriperi, 1997).

Studies have also shown that a particular rank within the group is a social outcome resulting from, and determined by, personality as well as other physical characteristics (Konecna et al., 2012). These findings indicate that low ranking or emigrating individuals with high confidence scores should be more likely to achieve high rank in a new troop. Also high ranking individuals that are high in confidence should maintain their position longer (Konecna et al., 2012).



Reconciliation functions to reduce the risk of renewed aggression and re-establish the opponent's social relationship disrupted by the conflict (McFarland and Majolo, 2011). This is because these individuals will incur higher costs in terms of damage to their relationship and its associated benefits for individual fitness (McFarland and Majolo, 2011).

Grooming is the most common behaviour primates use to reconcile and maintain friendly social relationships (McFarland and Majolo, 2011). In macaques, dominant individuals have a stronger and larger network of grooming interactions with their group companions than subordinate individuals (McFarland and Majolo, 2011).



Figure 6. Group of young barbary macaques playing in a tree (scphoto48)

Macaques are mainly active during the daylight hours, spending most of their daytime foraging and retiring to the trees or caves at dusk (MPC, 2012; Bayne, 2005).

Their lifespan in the wild is around 22 years (MPC, 2012).

## 5. Reproduction

Barbary macaques are seasonal breeders; mating takes place in autumn/winter and births are in the spring or early summer with generally one infant per litter (MPC, 2012). The gestation period is between 5.5 to 6 months (MPC, 2012). Females reach sexual maturity at the age of 4, while males mature between 4.5 to 7 years of age (MPC, 2012; Maestripieri, 1997). In the wild, the average age of first birth is 5.3 years and the average interval between births is 1.3 years (MPC, 2012). Males migrate to different groups during the breeding season (MPC, 2012; Maestripieri, 1997).

Young males may be evicted from their natal group as they approach puberty, forming temporary “bachelor” groups until they join a new group (Bayne, 2005).

The reproductive approach of males contains three phases. Between 4 to 5 years of age, males sneak copulations or disturb mating by others (satellite males). At 6 to 7 years of age, males pursue a low risk strategy by staying at the edge of the group during mating season (peripheral males). Around 7 years of age males become established group members (Widdig et al., 2000). At the beginning, an age-dependent hierarchy exists due to physical differences between males of different ages but later, older males are often subordinates to young adults during conflicts (Widdig et al., 2000).



Figure 7. Barbary Macaque (*Macaca sylvanus*) mating, Ouzoud, Morocco (Eritja)

Females exhibit anogenital swelling and reddening of the skin, becoming more pronounced from beginning to the end of the menstrual cycle (Bayne, 2005). This display is a cue of fertility to indicate the periovulatory period to males (Young et al., 2013).



Figure 8. Female sexual swelling



## 5.1 Mother and Infant Relationship

Macaque infants communicate their basic needs (food, transport and protection) to their mothers mainly with vocalizations (Maestriperi, 1997), while mothers communicate with their offspring predominantly with facial expressions and body postures (Maestriperi, 1997). The mothers retrieve their infants from a distance by using the pucker, bared-teeth, lip-smack, or the presentation of hindquarters (Maestriperi, 1997), often walking backward from the infant to encourage their infants' independent locomotion (Maestriperi, 1997).

Male Barbary macaques show high parental care towards the offspring or infants of other females and they interact with infants with the same facial expressions and body postures as females (Maestriperi, 1997).



Figure 9. Barbary Macaques (an adult male and an infant) (Karyn Sig, 2006)

Evidence shows that female monkeys in Morocco have been observed suckling themselves, drinking their own milk, after the death of their offspring (Walker, 2009). The most possible explanation to this behaviour is that self-suckling is related to the emotional consequences of the loss of the infant. In humans and other species, breast-feeding reduces stress through the release of prolactin. Therefore self-suckling functions to reduce the stress generated by the loss of the infant (Walker, 2009).

## 6. Communication

Through evolutionary change non-human primates living in social groups developed several ways of communicating between each other through vocal, gestural, tactile, and olfactory signals (Maestriperi, 1997).

The functions of communication are to congregate individuals together when there is the need for cooperation, and to keep them separate when there is competition for resources (Maestriperi, 1997). The elaboration of this simple system of approach and avoidance helps in the creation of the complex way of communication between the individuals (Maestriperi, 1997). Communication through facial expressions and body postures plays an important role in the social dynamics of macaques (Maestriperi, 1997).

Long distance communication for indicating, for example, the presence or location of food or predators is more effective through vocalizations than gestures (Maestriperi, 1997). And that is normally performed between individuals that are out of each other's sight (Maestriperi, 1997). In contrast, it appears that the evolution of gestural communication in macaques has mainly operated at the level of intragroup social dynamics, favouring the use of gestures to control and coordinate the behaviour of individuals within the group (Maestriperi, 1997).

The role of chemical communication (through scents) is not known in this species, but is likely to occur (Call & Tomasello, 2007).

Gestural communication in macaques allows individuals to negotiate access to resources while reducing the probability of costly fights (Maestriperi, 1997). Macaques use a variety of gestures to communicate their intention to engage in or to avoid a fight (Maestriperi, 1997) and threat signals mostly involve the face (Maestriperi, 1997). Threats use almost all the elements of the face: forehead, eyebrows, eyes, nose, ears and mouth (Maestriperi, 1997). The degree to which facial elements are used varies depending upon the intensity: simple staring signals a threat of low intensity, as the intensity of the threat increases, then the eyebrows, ears and mouth are used too (Maestriperi, 1997). Threat displays also include opening the mouth in the shape of an "O", a direct stare, raising the eyebrows, shaking an object in their environment, or charging with the intent to fight (Bayne, 2005).

A threat gesture is often sufficient to resolve a dispute between two individuals, as the two individuals are likely to have met in the past and have a good memory of the result of the previous agonistic interaction. Therefore it is in the interest of both opponents to settle their contest with an exchange of signals rather than with another fight (Maestriperi, 1997).

Normally threats are displayed by higher-ranking individuals to the lower-ranking individuals. But sometimes lower ranking individuals may threaten dominants due to object competition and when subordinates have the chance to recruit other individuals as allies. Subordinate threats are often accompanied by recruitment screams that can be referred to defensive threats because they often happen in response to a threat or aggression by dominant individuals (Maestriperi, 1997).

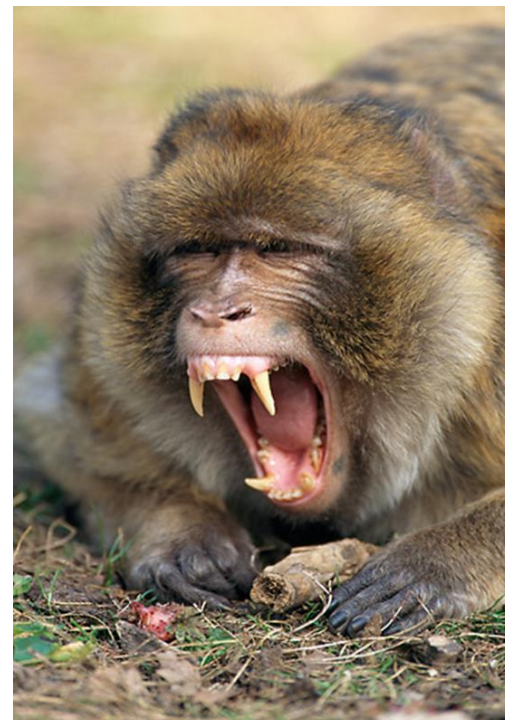


Figure 10. Close-Up Of Barbary Macaque With Mouth Open Gibraltar (Wildlife Bildagentur GmbH)

## 6.1 Dominant Signals

Dominant individuals may also use other behaviours to maintain and reinforce their position. One common assertive behaviour is mounting, performed by dominant to subordinates of the same or opposite sex (Maestriperi, 1997). Assertive mounting, similar to sexual mounting, is often incomplete and lasts less than a sexual mounting (Maestriperi, 1997). Mounting, best viewed as a display of strength and power, is important in allowing individuals to settle a dispute without a fight (Maestriperi, 1997).

Mounts do not impend an agonistic behaviour, but often occur after a conflict where aggressor and victim mount each other or are mounted by a third macaque not involved in the conflict (Maestriperi, 1997). Mounts depend on the rank of the individuals involved and their role in the conflict. The aggressor can mount the victim after the fight to reassert the outcome of the conflict, or mount a third individual to discourage the potential participation of the individual into the conflict or to gain its support (Maestriperi, 1997). Also the victim can mount a third macaque to gain its support or avoid its intervention in the conflict. Or eventually, a third individual, if higher ranking than the competitors, may mount the aggressor to put an end to the conflict.



Figure 11. Barbary macaques mounting (Walz, 2007)

## 6.2 Submissive Signals

The most common submissive signal is the bared-teeth display in which the mouth is closed and the lips are retracted so the teeth are exposed in a white band (Maestriperi, 1997). This display is often showed in response to a variety of fearful and painful stimuli (Maestriperi, 1997). Or, in response to an approach by a dominant individual, bared-teeth displays can signal “I am afraid” or “do not attack me”. Often displaying this signal prevents an aggressive behaviour from another individual and usually the potential aggressor walks away from the sender of the signal (Maestriperi, 1997).

Another common submissive signal is the hindquarter presentation where the hindquarters are orientated towards another individual. This signal is often given by subordinate to dominant individuals upon receiving aggression or when there is a high risk of aggression (Maestriperi, 1997).

Lip-smacking involves rapid opening and closing of the mouth and lips, so when the lips close they make a smacking sound (Maestriperi, 1997). Teeth-chattering involves a rapid opening and closing of the mouth, but is different from lip-smacking; the lips are retracted exposing the teeth (Maestriperi, 1997). These two behaviours are mainly displayed by subordinates to dominants, indicating that these signals have a submissive function. Teeth-chattering is also used during the course of affiliative interactions (Maestriperi, 1997).



Figure 12. Barbary macaque teeth chattering to the young (Graham)



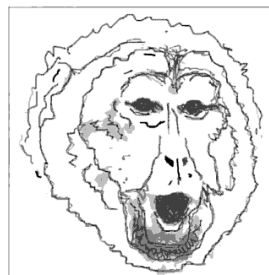
### 6.3 Main Facial Expressions of the Barbary macaque



This is a typical teeth chatter whereby the macaques exposes the teeth and chatter them together in a quick manner. This is usually a friendly and submissive action.



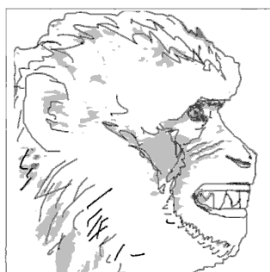
Baring of the teeth is also another expression of submission whereby the teeth are clenched and the corners of the lips are retracted backwards.



(unvocalised) scream face often seen during times of conflict.



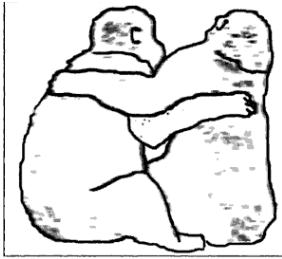
Typical rounded threat face.



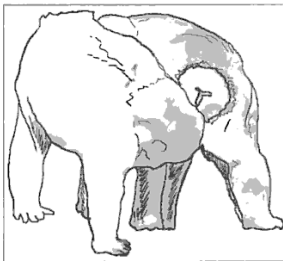
Another typical threat face but this time accompanied by a stare and a downwards lowering of the body.



Yawning serves as a threatening gesture.



A hug. This is often seen after a conflict has occurred within the group. They sit in close contact and grab at each other's fur. They may touch each other's genitals.



The anti-parallel position. This is also a way of resolving conflict. It involves inspecting each other's rears and genitals and lip-smacking.

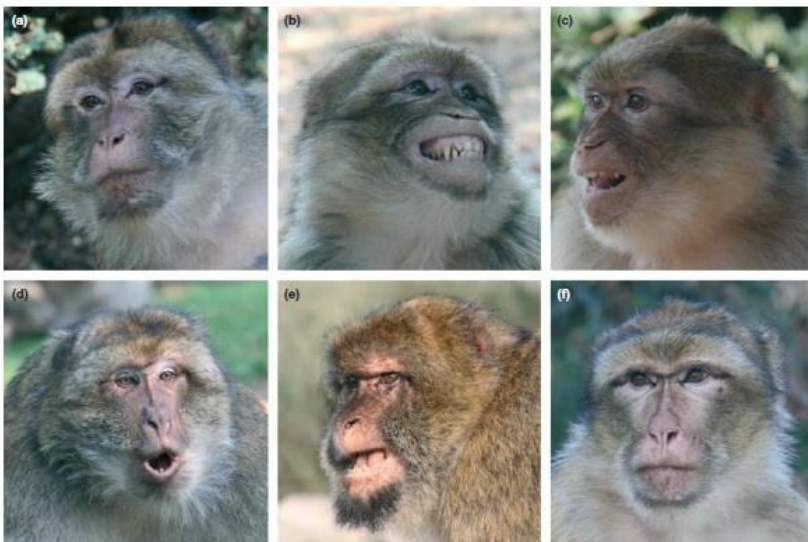


Figure 13.

Different facial expressions of Barbary macaques used in Fischer's gaze-following research: (a) alert, (b) submissive, (c) affiliative, (d) threat, (e) commenting, (f) neutral. Image from Teufel, Gutmann, Pirow & Fischer 2010, Dev Sci

## 7. Status

### 7.1 Introduction

Populations of wild Barbary macaques have declined at a rate greater than 50% over the last 3 generations (24 years) (Camperio Ciani et al., 2005). In 2008, the population of Moroccan Barbary macaques were reclassified endangered by the IUCN Red List (Camperio Ciani et al., 2005) (Lavieren, 2012; Lavieren and Wich, 2009; Alami et al., 2013; Eurogroup for Animals, 2011; MPC, 2012; Butynski et al., 2008). They are also currently listed on Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES, 2015).

In 1975, Taub estimated that there were 21,000 individuals left in the wild and the latest census indicates that the number has fallen to 8,000, of which 5,000-6,000 were present in Morocco (Lavieren, 2012; Alami et al., 2013; MPC, 2012). The Middle Atlas population in Ifrane National Park is the largest Barbary macaque population in the world, containing approximately 65% of the remaining population (Lavieren, 2012; MPC, 2012). While the Algerian populations have decreased in size (Lavieren, 2012).

### 7.2 Threats

Considerable efforts have been made through research and species monitoring to evaluate the level of decline of this species and its causes (MPC, 2012).

The main threats are human pressure, habitat destruction and the illegal trade in infants. The degree of threat varies depending on the region (Lavieren, 2012; Lavieren and Wich, 2009; Alami et al., 2013; Taub, 1975; Taub, 1977; Deag, 1977; Camperio Ciani et al., 2003; Camperio Ciani et al., 2005)

#### 7.2.1 Human Pressure and Habitat Destruction

In Morocco, particularly in the Middle Atlas, habitat destruction is mainly caused by illegal logging and charcoal production (Lavieren, 2012). Cedar and oak trees, which form the natural habitat of Barbary macaques, are common wood for making furniture and handicrafts. Therefore a lot of this wood has been illegally cut down to such an extent that in some areas these trees have completely disappeared, creating fragmented patches of forest. In these fragments there are few macaques left and their survival is compromised (Lavieren, 2012; Alami et al., 2013).



Figure 14.

Extensive quarrying in this part of Morocco has destroyed the landscape and isolated populations of macaques (IPPL, 2015)



**Livestock** grazing is another major problem in the Barbary macaques' habitat. The number of goats and sheep has increased over the years leading to a greater competition over food and water between macaques and humans with their livestock (Lavieren, 2012; Lavieren and Wich, 2009; Camperio Ciani et al., 2001). As a result, Barbary macaques are forced to use unnatural sources of water, for example from tourists (Lavieren, 2012).

Livestock overgrazing of forest undergrowth prevents the regeneration of trees and shrubs. A general decline in vegetation cover means the reduction in diversity of plant species which is an important food source for these monkeys (MPC, 2012).

Also shepherd dogs guarding cattle often attack Barbary macaques (MPC, 2012).



Figure 15.  
Fields of sheep in Morocco (Simkin, 2010)

**Ancient nomadic tribes** have the right to inhabit the Ifrane National Park and to use its land to graze their flocks. In the past these tribes lived on this land only during the summer months whereas nowadays they stay for the whole year. This change in tribal patterns has caused too much pressure on the forests where cedar trees are used for fire and for feeding goats (Lavieren, 2012; Lavieren and Wich, 2009).



Figure 16.  
Fragmented Barbary Macaque habitat: here the gap is small enough to create a corridor. (MPC)

**Tourism** negatively affects the behaviour of Barbary macaques: frequent physical interactions with the monkeys increases aggression and stress/anxiety levels and reduces social behaviour between conspecifics (MPC, 2012). Tourists feeding the monkeys near roads increase the chances of macaques being poached or killed in road accidents (MPC, 2012). Tourism is also responsible for habitat degradation and garbage accumulation (MPC, 2012).



Figure 17.

Cyclist Feeding Gibraltar Barbay macaque - A tourist feeding a pair of adult macaques at the top of the Rock of Gibraltar. Feeding the monkeys is illegal but fines are rarely enforced (Forsyth)



Figure 18.

Barbary Macaque (*Macaca sylvanus*) eating potato chips stolen from tourists, Gibraltar, United Kingdom

## 7.2.2 Illegal Trade

The illegal trade became apparent in the late 90's. Infant macaques are captured from the wild and sold in the markets, mainly to Moroccans living in Europe (who were on their holidays in Morocco), who smuggle them back to Europe to keep them as pets (Lavieren, 2012). Between 1995 and 2009 approximately 300 infant macaques were captured from the wild every year (Lavieren, 2012; Lavieren and Wich, 2009; Eurogroup for Animals, 2011). These infants were mainly captured from one specific region generating a huge negative impact on the number of wild macaques (Lavieren, 2004; 2008; 2012).

Although national laws protect this species (MPC, 2012), more needs to be done to regulate the trade. The following factors are contributing to the decline of macaques:

- the relative ease with which the macaques can be purchased
- the lack of control of poaching in the forests
- the open sale of them in the markets
- the lack of border control between Morocco and Spain (Lavieren and Wich, 2009)
- lack of awareness, ineffectiveness of law enforcement and the high demand for the species in the European Union (MPC, 2012)

The sale of Barbary macaques is illegal in Morocco and punishable by a fine, the confiscation of the animal and the closure of the vendor's business (Waters and El-Harrad, 2013).



Figure 19. (MPC Foundation, 2014)



Figure 20.  
(Stichting AAP, 2015)



### 7.2.2.1 Zoonotic Diseases

There is increasing evidence that the importation of exotic species for the pet trade threatens not only the survival of wild species and biodiversity, but also the health of humans and domestic animals from the transmission of zoonotic diseases (Eurogroup for Animals, 2011). Over 70% of zoonotic infectious diseases originated in wild populations such as rabies, monkeypox and herpes B virus which have all been transmitted from exotic animals to owners and pet shop workers (Eurogroup for Animals, 2011).

Macaques particularly are a frequent carrier of the Simian Herpes B virus, which is asymptomatic in the animals but can be fatal to humans (Bayne, 2005), and can be transmitted by physical contact with infected bodily fluids of the monkey to the human via broken skin (Bayne, 2005).



Figure 21.

Bite wound exposing the subcutaneous fat

### 7.2.2.2 Physiological and Behavioural Needs

Exotic species have complex needs when it comes to nutrition, housing, temperature requirements, exercise and social structures (Eurogroup for Animals, 2011). Owners often lack the basic knowledge necessary to meet the care requirements for these species (Bayne, 2005). When keeping primates in captivity there is an ethical responsibility to provide the animals with an environment that promotes their physical and behavioural health and well-being (Bayne, 2005).

Abnormal behaviours are the result of captive housing, reflecting an inadequate environment for maintaining the animal (Bayne, 2005).

Abnormal behaviours include repetitive movements, such as pacing, circling, rocking, spinning and bouncing (Bayne, 2005). Self-clasping, self-sucking, masturbation, eating faeces, hair plucking, self-biting and head banging, all actions that can injure the animal (Bayne, 2005).

## 8. Conservation Actions

Over the last few decades there have been repeated surveys of the species in the wild, mainly carried out by scientists from outside the range states. The national authorities are aware of these surveys but do not always support or agree with the outcome (Butynski *et al.*, 2008). 8 years ago the national forestry department in Morocco believed that there were too many Barbary macaques in the wild and that they are responsible for the degradation of cedar forests through their bark stripping behaviour (Lavieren, 2012). The authorities developed plans to translocate groups into other regions or to introduce a natural predator such a leopard to keep the population numbers down (Butynski *et al.*, 2008). This information was incorrect and created by the logging industry that was searching for an excuse to explain the bad conditions of the forests (Lavieren, 2012).

Bark-stripping behaviour is a survival strategy in times when water is scarce or a source of nutrients and minerals is unavailable in other sites (Lavieren and Wich, 2009; Camperio Ciani *et al.*, 2001; 2003). Because this natural behaviour can not only severely damage trees and possibly even kill them, it decreases timber quality and volume, so the Moroccan authorities considered the stripping a serious threat to cedar forests (Lavieren and Wich, 2009; Camperio Ciani *et al.*, 2001; 2003).

The true status of Barbary macaques is alarming (Lavieren, 2012).

International organisations and NGOs have shown interest in helping to conserve this endangered species and they organized a workshop to analyse the threats to this species and identified ways to obtain the objectives set for the next twenty years (MPC, 2012).

The conservation of Barbary macaques requires a multi-level approach from poacher level to government level (Lavieren, 2012).

Measures have already been taken to improve the conservation status of the macaques:

- The creation of the National Park of Ifrane (PNI) and development of its management plan to protect these primates and their habitat. (Alami *et al.*, 2013; MPC, 2012)
- Increasing control against poaching and illegal trade
- Organisation of awareness campaigns in collaboration with national and international NGOs (Alami *et al.*, 2013; MPC, 2012) through the handing out information leaflets to potential buyers of macaques in the port of Algeciras in Spain, to not buy macaques or take pictures with them (Lavieren, 2012).
- Restoration of the Barbary macaque populations and its habitat in the Middle Atlas.
- Enforcement of current laws against capture of macaques (Alami *et al.*, 2013)

Other conservation measures have been proposed and partly implemented, such as restricting access of grazing animals; zonation with fencing; forest guarding and education about sustainable use of forest resources (Lavieren and Wich, 2009). However, the macaques remain threatened (Lavieren and Wich, 2009).

The trade in wild animals in Morocco is regulated by existing legislation (Lavieren, 2012; Butynski *et al.*, 2008) meaning that capture, hunting, possession and sale of Barbary macaques are prohibited (MPC, 2012). However a new wildlife trade law has passed and if enforced correctly, can have a positive effect on stopping the illegal wildlife trade. Still it will take a lot of money, time and effort before that can happen: authorities need to be trained and a solution has to be created for confiscated animals (Lavieren, 2012).

## 8.1 Organizations for the Protection of the Barbary macaque

**m p c**

moroccan primate conservation foundation

**The Moroccan Primate Conservation Foundation (MPC)** was founded in 2004 to protect this species and stop its decline. MPC has conducted educational activities, monitoring of the trade, lobbying the government, training of national park staff and more.

MPC works with local fossil/souvenir sellers based in Ifrane National Park, who have now become “macaque guards”.

This has helped to decrease the number of infants poached in the area. However, this decrease could be temporary and it might have caused a geographical shift of where poaching now takes place (Lavieren, 2012).

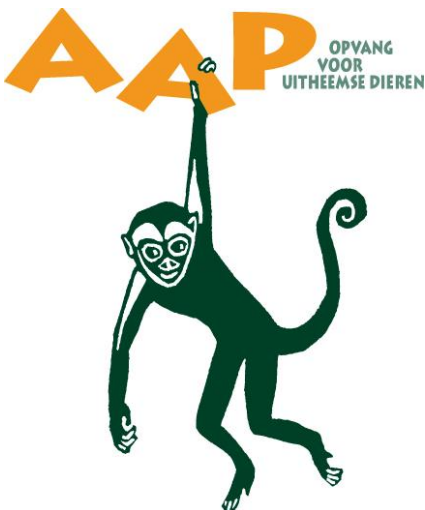


**Barbary Macaque Awareness and Conservation (BMAC** – formerly Barbary Macaque Conservation in the Rif or BMCRif) is an interdisciplinary Moroccan conservation NGO which uses social and natural science research methods to drive conservation actions. This organization also monitors wild populations and raises awareness amongst both rural and urban populations in Morocco. Moroccans tend to lack awareness of conservation and views of macaques differ between rural and urban human populations, necessitating different approaches for both (Waters and El-Harrad, 2013).

In the urban population, the lack of knowledge of Moroccan wildlife results in much of the illegal trade going unreported within the country.

BMAC focuses on Morocco’s urban middle class because they are the main buyers of infant Barbary macaques, usually while on holiday in cities where infants are openly for sale. Urban Moroccans tend to be literate and have access to internet (Waters and El-Harrad, 2013).

The use of social media sites is common amongst conservation activities to communicate with the public and to raise awareness against primate pet-keeping (Waters and El-Harrad, 2013).



**AAP** (a Netherlands-based sanctuary for exotic animals) has initiated a project to combat the illegal trade of Barbary Macaques in Europe, involving awareness raising among potential buyers, cooperation with authorities in the consuming countries and training of customs officers in Spain (E. van Lavieren pers. comm. 2006). In Algeria, the ecological association Amazer-N’-Kefrida carried out public education and awareness raising campaigns in 2006 and 2007, against illegal trade, commercial uses, and improper artificial feeding of Barbary macaques, in close collaborating with the Gendarmerie Nationale (National Police), the Algerian Customs, the Laboratory of Ecology and Environment of the Université de Béjaïa, the General Forests Directorate, and the National Parks (F. Belbachir pers. comm. 2007; Butynski *et al.*, 2008).



In Algeria, most Barbary macaque habitat falls within National Parks of Djurdjura, Taza, Chr ea, and Gouraya. In Morocco, Barbary macaque populations are present in the protected areas of Toubkal National Park, Eastern High Atlas N.P., Ifrane N.P., Talassemtane N.P., Bou Hachem Reserve and Djebel Moussa N.P., but many populations live in unprotected areas. Unfortunately the parks in Algeria and Morocco suffer from significant human impact, and all these areas require much stricter protection than is currently in place (Butynski *et al.*, 2008).

Barbary Macaques breed well in captivity. The possibility of reintroducing animals to northern Tunisia, where they went extinct in the 1900s, should also be studied (Butynski *et al.*, 2008).

The creation of a sanctuary for confiscated macaques has been recommended, which could form the basis for an introduction programme and future restoration of wild populations of macaques (Lavieren and Wich, 2009)

## 9. Why is this species so important?

There are fewer Barbary macaques in the wild than there are Sumatran orang-utans or western or eastern lowland gorillas. If no action is taken, there will be no Barbary macaques in the wild in 10-15 years.

Saving Barbary macaque populations also means saving the forests of the Middle Atlas mountains. The forest is a wealth of biodiversity including rare plant and animal species. Barbary macaques help the forests by spreading seeds, which promotes tree growth, and also by controlling insect populations. Barbary macaques also provide opportunities for ecotourism for the Ifrane National Park which generates wealth for the area.

Barbary macaques can be used as an indicator of forest quality and the demographic differences between the populations living in different habitats are the results of deforestation, overgrazing and human interference (Alami *et al.*, 2013).



Figure 22. Monkeying Around (Mignorange, 2014)

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~ Breathe and Smile ~

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