

INFANT BARBARY MACAQUES ON SALE IN MARRAKECH RONALD TROOSTWIJK

## THE ILLEGAL TRADE IN BARBARY MACAQUES FROM MOROCCO

## AND ITS IMPACT ON THE WILD POPULATION

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### INTRODUCTION

Morocco is known to be a passage to Europe for the illegal trade in animal and plant species originating from northern and western Africa (H. Mesbah, CITES Management Authority, Morocco, pers. comm., 2006). The Barbary Macaque *Macaca sylvanus*, a unique species that occurs in Morocco and Algeria, has been facing a decline in numbers over recent decades, fuelled in large part by their demand for the illegal pet trade, which became apparent in the late 1990s. At this time, zoological parks and sanctuaries in Europe started to notice a significant increase in the number of Barbary Macaques being offered for shelter by ex-owners and in the numbers arriving at their premises after being seized by law enforcement authorities, mainly in France, Belgium, Spain, Germany and the Netherlands. The majority of these animals were most likely wild caught, as many ex-owners of the macaques—principally European Moroccans—stated that they had purchased their pet at local markets in Morocco during their summer holidays. The Strait of Gibraltar is likely the main port of entry (Shipp, 2002), being the route that millions of European Moroccans choose for their annual holiday to Morocco.

Loss of habitat has been the prime factor held responsible for the decline in Barbary Macaque populations (Taub, 1975, 1977; Deag, 1977; Camperio Ciani *et al.* 2003, 2005). At present, however, it appears that the

international trade in live specimens is contributing to the species's decline. However, little research has been conducted into the importance of this trade. This study, which was carried out between November 2003 and July 2007, focuses on (i) the trade in Europe and Morocco: quantitative and qualitative data to analyse the dynamics of this trade; and, (ii) the impact of the trade on the wild population of Barbary Macaques in Morocco.

All references to macaques in this paper refer specifically to Barbary Macaques.

### METHODS

#### Data collection on the trade

##### *Europe*

Several international organizations (IUCN-The World Conservation Union, WWF, CITES Secretariat and UNEP/WCMC), and GONHS (Gibraltar Ornithological Natural History Society) were asked during the period of the survey to provide information and figures on the trade in Barbary Macaques in Europe. Additional information was gathered from sanctuaries and zoos involved in sheltering Barbary Macaques in Europe (selected from the ISIS (International Species Information System) database) and local animal welfare organizations such as One Voice in France. For this purpose, a questionnaire was developed which focused mainly on the demographics of macaques offered to them or taken in during the previous four years. The information that was provided is presented in the results section and is described in more detail in van Lavieren (2004).

##### *Morocco*

According to the sanctuaries in Europe which responded to the questionnaire, many people who handed their monkeys over for shelter reported that they had bought their macaque from markets in Morocco, sometimes naming their location. Market surveys were therefore conducted, in September 2004, assisted by a Moroccan employee of the Institut Scientifique in Rabat, to learn how many macaques were being offered for sale in markets. The following cities and other significant areas were surveyed: Casablanca, Rabat, Salé, Meknès, Fès, Azrou, Ifrane, Middle Atlas Region, Timahdite, Khenifra, Zaouiet Chikh, Cascades d'Ouzoud and Marrakech. These sites represent the major tourist areas in the country, or they are situated in close proximity to the Middle Atlas region—the region where Barbary Macaques live in the wild. The northern part of Morocco—the Rif mountain region—was excluded from this survey due to limited time availability.

Up to three days were spent in each market in the cities surveyed, depending on the time required to gather sufficient information. All information was gathered via semi-structured interviews with the vendors. Estimations of the number of monkeys offered for sale annually were made based on the information provided



Fig. 1. Map of Morocco showing some of the survey sites.

Barbary Macaque *Macaca sylvanus*,  
mother and young.  
Atlas Mountains, Morocco.



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by traders in order to establish a general level of trade per survey site.

To find out whether monkeys were being sold openly or covertly, an initial orientation survey was conducted at each site. The trade in Barbary Macaques is illegal in Morocco. The laws are however very poorly enforced and the traders showed little anxiety in speaking openly about their practices. After initial inquiries on pet sales in general, specific questions were asked on the trade in Barbary Macaques: their origin and methods of capture, how many were sold annually, the profile of buyers, the selling price, the age and sex of the macaques, the logistics of the trade, the methods used for smuggling across the border and the reason why people buy a macaque. The sites that are known for capturing monkeys for the trade were visited and interviews were conducted with vendors of fossils and other tourist items, as these people are known to be involved in the trade (pers. obs.).

The author also conducted a survey in Tangier market over a period of a week in July 2007.

#### *Influence on the wild population*

Based on the figures gathered in Morocco and Europe, a rough estimate was made of how many infant macaques are taken out of the wild population on a yearly basis. By using the model described by Robinson and Redford (1991), the annual sustainable offtake was then calculated.

#### LEGISLATION

The Barbary Macaque has been listed as “Vulnerable” on the IUCN Red List since 1986 (IUCN, 2007) and in CITES Appendix II since July 1975. It is also listed in Annex B of Regulation (CE) N°338/97. Since 2000, the EU has suspended imports of wild specimens of Barbary Macaque from Algeria and Morocco, under the provisions of Article 4.6(b), i.e. for conservation reasons. These suspensions were reconfirmed in 2006 (Regulation (CE) N°605/2006). The species is protected in Algeria and Morocco under national law: legal collection and export of specimens is subject to the authorization of a permit but it is understood that none has been issued to date? Regulation of the legislation is far from adequate, however. The national forestry departments—Eaux et Forêts—are the responsible authorities in these countries.

#### STATUS

The Barbary Macaque is the only species of the *Macaca* genus to be found in the wild outside Asia and the only surviving primate in Africa north of the Sahara desert. Its current distribution is limited to relict forest areas in Algeria and Morocco (Fa, 1984; Camperio Ciani, 1986; Menard and Vallet, 1993; Scheffrahn *et al.*, 1993). A semi-wild introduced population lives in

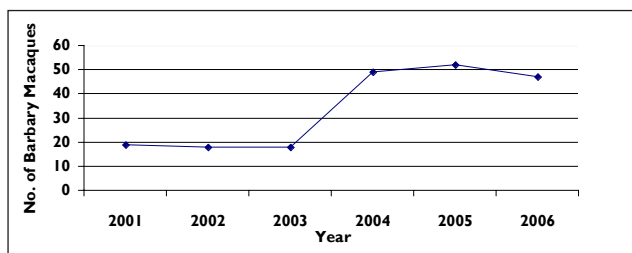


Fig. 2. Requests for shelter of Barbary Macaques at AAP, in the Netherlands, 2001 to 2006.

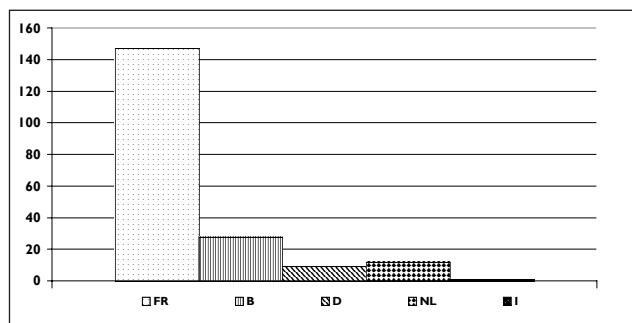


Fig. 3. Total number of requests per country for intake of Barbary Macaques at AAP, in the Netherlands, 2001 to 2006.

FR=France; B=Belgium; D=Germany; NL=Netherlands; I=Italy

Gibraltar (Fa, 1981). In Morocco, the Barbary Macaque can still be found in the Rif mountains (northern Morocco) and in the Middle- and High Atlas mountains (central/southern Morocco). In Algeria, the species lives in the Petit and Grande Kabylie mountains (Taub, 1977).

All populations are fragmented and small (Mehlman, 1989; Fa, 1984; Von Segesser *et al.*, 1999). The only area where the Barbary Macaque occurs in relative abundance, is the cedar-forested area of the Middle Atlas mountains of Morocco (Camperio Ciani *et al.* 2005), which represents the species's largest remaining refuge (Camperio Ciani, 1986; Camperio Ciani *et al.*, 2001), and therefore has a crucial role in the survival of the species. However, even this population has shown a persistent decline in numbers (Lilly and Mehlman, 1993; Camperio Ciani *et al.* 2003, 2005). Recent survey data show that the population in this region has declined from 44 to 15 individuals per km<sup>2</sup> (van Lavieren, 2005), in some areas dropping to an average density of seven to 10 individuals per km<sup>2</sup> (Camperio Ciani *et al.*, 2005), a decline of up to 84 per cent.

### The international trade

It is likely that the decline of the wild population of Barbary Macaques in the Middle Atlas is partly due to the trade in infant macaques, which appears to have increased in recent years. Some ex-owners explained how they bought and smuggled their pet into Europe (D. Bezdicikova, AAP, pers. comm., 2004). After discovering that caring for a primate in captivity is more dangerous and difficult than expected, many owners soon want

to dispose of their pet. In the best cases, these monkeys are brought to sanctuaries voluntarily or they are set free in the outskirts of cities and towns. Consequently, sanctuaries are becoming overstocked with Barbary Macaques, resulting in long waiting lists for the animals to be accepted owing to a lack of space (AAP, Vallée des Singes, Parc Zoologique de Paris, pers. comm., 2004). Eventually, an unknown percentage of these animals is killed by euthanasia (One Voice, pers. comm., 2004).

In France, Barbary Macaques are also used as fighting monkeys in tower block basements (Henley, 2000; El Azizi, 2006), and in some cases, they serve as a substitute for guard dogs (Henley, 2000; Crumley, 2000; Anon., 2000; Anon., 2003).

## RESULTS

### Europe

Seventeen zoological parks and sanctuaries in Europe known to have Barbary Macaques in their collection were sent a questionnaire. The response rate was 88 per cent. Most Barbary Macaques in trade go to France. According to one zoo in that country, a total of? approximately 160 Barbary Macaques were offered to them in 2003 and 2004 [or each year?]. This zoo also reports that the majority of the macaques offered had to be killed by euthanasia owing to lack of space for the animals (Roussel, 2004). It has been claimed that over 500 macaques were smuggled into France from Morocco between 1998 and 2000 (Untertiner, 2003), however this has not been confirmed by the French police. Recently the French police stated that they seize approximately 50 macaques in France each year (R. Reijnen, pers. comm., 2007).

AAP, Sanctuary for Exotic Animals (based in the Netherlands) is one of the few institutions left in Europe to give shelter to Barbary Macaques. AAP currently has a long waiting list for specimens of this species and many animals that cannot be taken in are killed by euthanasia, mainly in France (One Voice, pers. comm., 2004). Figure 2 shows the numbers of Barbary Macaques being offered to AAP for shelter over recent years. These data only show the numbers offered to one sanctuary. Fifty per cent of the sanctuaries that received a questionnaire confirmed an increase in the numbers of macaques offered for shelter between 2000 and 2004 (van Lavieren, 2004). A recent survey conducted by AAP shows that seven zoos and rescue centres in France state that the trade in Barbary Macaques again increased (average 40 per cent) in the last four years (R. Reijnen, pers. comm., 2007). The trade exists in several European countries (Figure 3). In the late 1960s and during the 1970s, hundreds of Barbary Macaques were captured for export to zoos, mainly in Europe (Deag, 1977). The official CITES statistics cover the importation of 591 specimens from Morocco to Europe between 1976 and 2004, whereas the export data for Morocco for the same period report 930 specimens (UNEP-WCMC, 2006). Most

Location	Trade present/absent	Level of trade
Rabat	Absent	
Salé	Present	*
Casablanca	Present	**
Meknès	Absent	
Fès	Present	**
Azrou / Ifrane region	Present	***
Khenifra	Absent	
Timahdite	Absent	
Zaouiet Chikh	Present	***
Cascades d'Ouzoud	Absent	
Marrakech	Present	***

**Table 1. Presence, absence and levels of trade at survey sites.**

*Levels of trade:*

- \* = occasionally present (0-10 per annum)
- \*\* = constantly present (10-25 per annum)
- \*\*\* = major trade location (>25 per annum)

were traded alive, and only a small portion was officially destined for the pet trade. Whereas 62.4% (i.e. 369 out of 591) of individuals was reported in import statistics to originate from the wild or to be of unknown source, this only applies to 35.3% (i.e. 329 out of 930) in export statistics. Since 1976 there have been no export permits recorded for Algeria. The author does not know the reason for the large discrepancies between the import and export statistics. Since 1991, only 40 illegally transported live Barbary Macaques originating from Morocco have been confiscated, mainly at the borders of southern Spain (CITES Trade Database Report, 2006).

### Morocco

#### Survey sites

Table 1 shows an overview of the level of trade at the survey sites. Not many macaques are openly offered for sale, with the exception of Marrakech (an average of six



A Barbary Macaque on sale in Tangier market (Place El Jdida). This animal was seized after the author informed the authorities that it was on sale; it was subsequently placed in Rabat Zoo.

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infants are offered for sale openly on a daily basis throughout the year) and Fès (two infants were observed openly for sale). During recent surveys by the author (July, 2007), three infants were openly offered for sale in Tangier market, Place El Jdida, over a period of one week. The vendors here explained that when somebody expressed an interest in buying a macaque, they transport the infant from the Middle Atlas. The transaction then takes place a day or two later. In the Middle Atlas region, Marrakech and Fès, however, the transactions can take place the same day. Table 2 shows the profile of the consumers at the survey sites; the main group of consumers are Moroccan emigrants.

#### Customs

It was claimed by vendors that it is relatively easy to smuggle a macaque across the border into Europe and

LOCATION	PROFILE OF BUYER
Salé	European Moroccans (+++); expatriates living in Morocco (+)
Casablanca	European Moroccans (France, Italy) (+++); young Moroccans (++); European tourists (+)
Fès	Europeans (France, Spain, Italy, Belgium, Netherlands) (++); European Moroccans (++); young Moroccans (+)
Azrou/Ifrane region	Moroccans (++); European Moroccans (France) (+++); Europeans (+)
Zaouiet Chikh	Moroccans—no clear profile confirmed
Marrakech	European Moroccans (+++); Europeans (++); European circuses and zoos

**Table 2. Profile of consumers at survey sites.** (+) occasionally; (++) frequently; (+++) majority

they were more than willing to give recommendations on the methods employed for such activities. They explained that the most effective way is to pay a Customs officer approximately 20–50 Euros who will then permit passage with one monkey. As there is no sanctuary for seized animals in Morocco, Customs officers prefer accepting money to seizing the monkey and having nowhere to place it. Other methods include sedation of the animal and asking a lorry driver to take it across the border, or to buy forged vaccination and export documents. The author has crossed both the Moroccan and Spanish border numerous times by car and has never been subject to a search. In all cases it would have been extremely easy to smuggle animals across the borders. Once in Europe, the borders are open. The Customs officers of the southern Spanish ports claim that in the months of August and September, around 200 000 cars cross the borders into Spain from Morocco when the European Moroccans return from holiday. It is impossible during this time to conduct a thorough search of all cars and the priority for Customs is to seize illicit drugs and people entering the country illegally (M. Torroba, Spanish Customs, pers. comm., June 2007).

#### Capture season

Barbary Macaques are born from April through June (Deag, 1984). Specimens are sold up until they are one year old, which means that they can be sold throughout the year. However, the trade is at its peak during the summer months when European Moroccans arrive on holiday. This corresponds with the experience of sanctuaries and authorities, which report that they are offered macaques for shelter during the autumn months in particular.

#### Estimation of numbers taken from the wild

From the data gathered during this survey, a rough estimate was made of the number of macaques that are being captured in the wild and smuggled into Europe. The larger cities sell around 50 to 80 macaques annually, and around Azrou in the late summer each capture team is reported to take up to four macaques a day during a one- to two-month period, amounting to more than 200 monkeys in these months. One group had captured 105 infant macaques in August alone (fossil sellers, pers. comm., 2005). Based on these numbers, it is estimated that the total number of macaques captured from the wild for trade to Europe is approximately 300 annually. It should be noted that these estimates lack accuracy.

#### Influence on the population

The trapping or hunting of animals is only sustainable when the harvest does not exceed net production. Robinson and Redford (1991) state that the maximum possible sustainable offtake is 20 per cent of the production in long-lived species. To estimate the proportion of the production that can be harvested by human hunters, Robinson and Redford (1991) suggested using the average life span of a species as an index of the number of animals that would have died in the absence of human hunting or capture. This model assumes that maximum production would be achieved when the population density corresponds with 60 per cent of the carrying capacity (K), where K is assumed to be the density of an un hunted, undisturbed population (Robinson and Redford, 1986). Although some of the population parameters require updating, they are the best available

#### BOX 1. METHODS USED TO CAPTURE BARBARY MACAQUES

Vendors and captors reported that they had official permits for the capture of macaques. It is not clear whether these permits are legal and who provides them.

1. Vendors selling Barbary Macaques in Casablanca reported that they capture macaques with the use of a clay pot with a small opening, inside which is some food. The macaque reaches inside the pot, grabs the food, but is unable to remove its hand from the pot with the food still in its hand. Other macaques in the vicinity are kept at bay by being threatened with sticks.
2. Captors in Fès and the Azrou region offer the infant macaque bread with wine and/or a sedative as a means of capture; the adult macaques are kept away with sticks.
3. Infant macaques being carried by their mothers may also be targeted in trees by groups of people with packs of dogs; one person climbs the tree to harass the mother with a stick until she drops the infant, which falls to the group below. It is not known how many infant macaques die during this procedure.
4. Barbary Macaques are also captured with nets. The animals walk on to a net laid across the ground and the captors pull a rope causing part of the net to fall on to the animals.



PARAMETER		REMARKS
Total population size	8000–10 000 individuals	Optimistic population size (see discussion)
Number of females in population	4000–5000	Assuming that sex ratio in population is near unity (Taub, 1977; Donohoe, unpublished data)
Females first birth	4.8 years of age	(Lindenfors, 2002)
Interbirth interval	1.5 years	1 year (Lindenfors, 2002) and 2 years (Taub, 1974, in Fa, 1984) makes an average of 1.5 years. Females give birth to 1 offspring.
Maximum recorded lifespan	22 years	(Lindenfors, 2002)
Reproductive age class	55%	
Infant mortality	23–27% per annum	(Rowe, 1996)

**Table 3. Parameters used for calculation of maximum sustainable offtake.**

Number of reproductive females:	$4000 \times 0.55 = 2200$	$5000 \times 0.55 = 2750$
Maximum annual offspring:	$2200/1.5 = 1466$	$2750/1.5 = 1833$
Annual infant mortality in numbers:	$1466 \times 0.23 = 337$	$1833 \times 0.2 = 495$
Annual production of population:	$1466 - 337 = 1129$	$1833 - 495 = 1338$

**Table 4. Calculation of maximum sustainable offtake.**

to make a rough calculation of the maximum allowable sustainable offtake. Owing to the paucity of available data, no confidence limits can be given. The parameters used for this calculation are listed in Table 3. With a range of 8000 to 10 000 individuals, the calculation set down in Table 4 can be made.

If the annual production of the Barbary Macaque population ranges from 1129 to 1338 macaques, the maximum range of macaques that can be harvested annually is 20 per cent: the maximum sustainable offtake would be in the range of 225 to 268 individuals annually.

A second method to calculate the sustainable annual offtake is based on the model by [Robinson and Redford \(1991\)](#) used by scientists to calculate the maximum sustainable harvest and percentage offtake for several primate species. The maximum percentage sustainable offtake of the total population of these species lies at around 2.5 per cent per annum (Robinson and Bennet, 2000). If the total population of wild Barbary Macaques is 8000 to 10 000 individuals, the maximum percentage of sustainable offtake ranges from between 200 and 250 individuals. These results are very similar to those resulting from the model used above.

Even if the annual offtake of Barbary Macaques in Morocco is an estimated 300 macaques, the offtake due to trade exceeds sustainability by up to 50 per cent. Considering the capture methods (Box 1), it is expected that the mortality of the mothers during capture is low, and this is confirmed by the vendors.

A survey of the wild population of Barbary Macaques in the Middle Atlas in 2005 ([van Lavieren, 2005](#)) showed a decrease in numbers of infants of up to 70 per cent over the period of June 2005 to December 2005. Taking into consideration that the natural infant mortality of Barbary Macaques is between 23 per cent and 27 per cent (Rowe, 1996), there is reason to believe

that the large decrease was partly caused by the capture for live trade. The same survey calculated a shortage of infants of 40 percent within the natural female–infant ratio of the species.

## DISCUSSION

The data show that the illegal trade in Barbary Macaques from Morocco to Europe is persistent. Many macaques enter Europe annually in spite of the CITES import suspension, and their source can be traced back to Morocco. There are recent indications that there is some trade coming from Algeria, but the trade in that country is mainly domestic (M. Nouar, pers. comm., 2007).

Because of the illegal status of the trade, it has been difficult to obtain accurate data on the extent of this trade to Europe. However, the data recorded in this study suggest that the problem is apparent over the last decade and that the average estimate of present capture offtake (300 annually), exceeds the sustainable offtake when calculated as above using both models. In both models the natural emigration and the adult mortality rates have not been considered in the calculation, and the population is treated as one single population, not taking into account fragmentation into dispersed sub-populations. This means that the maximum percentage sustainable offtake is likely to be even lower than calculations show. Also, an optimistic population size of 8000 to 10 000 individuals is used in this calculation, whereas recent surveys of the population size in the Middle Atlas estimates 6000 ([van Lavieren, 2005](#), unpublished; [Camperio Ciani, 2005](#)).

What makes these results even more dramatic is the fact that these figures only show the influence of the trade. The combination of habitat destruction—the main cause of the decline of the population—together with

unsustainable hunting of infants, undoubtedly exerts even more pressure on the population.

According to Camperio Ciani *et al.* (2005), the percentage of immatures is a strong indicator of the future perspectives of population growth or decline. Both Camperio Ciani *et al.* (2005) and Menard *et al.*, (1999) indicate that the proportion of immatures has dramatically decreased. If the adult population is not adequately replaced it progressively ages and declines (Camperio Ciani *et al.*, 2003).

Robinson and Redford (1991) assume that maximum productivity of a species is when the population is at 0.6K—i.e., 60 per cent of carrying capacity. But for many slow-breeding species, maximum productivity is closer to 0.9K. If the yield is constantly exceeded, the population will decline (Cowlshaw and Dunbar, 2000). It is assumed that the Barbary Macaque population is below 0.6K.

The limitations of both models are that neither incorporates stochasticity or the influence of immigration and emigration; in addition, there is no satisfactory method of establishing the carrying capacity (Cowlshaw and Dunbar, 2000). However the method proposed by Robinson and Redford (1991) is used widely and is especially developed to assess sustainability in the absence of detailed information about the demographic structure of hunted populations and the impact of hunting on that structure (Robinson and Bennet, 2000).

The reproductive age class percentage is set at 55 per cent of the females; this is based on a stable age class distribution. This percentage is kept relatively low as it takes into account the age of first breeding at 4.8 years, which is late considering the maximum recognized life span is 22 years. In the calculation, it is also assumed that the birth interval is every one and a half years for all reproductive ages. However, in practice, for the females in older age classes, the birth interval tends to decline. This further lowers the calculated sustainable offtake.

### **Consequences of unsustainable harvesting**

Harvested populations should not be reduced to densities where they are vulnerable to local extinction. Once the population reaches critical levels, local extinctions may be inevitable, even though hunting is stopped (Cowlshaw and Dunbar, 2000). Taking into account that the Barbary Macaque population is fragmented, the extinction risk is apparent. If the duration of poaching increases, the probability of extinction will rapidly increase (Kenney *et al.*, 1995).

If poaching can be effectively stopped for a particular population, recovery may follow, but even if a population survives a period of poaching and fully recovers to pre-poaching levels, genetic variability will be lost due to rapid population decline.

Loss of significant numbers of individuals can have wider repercussions throughout the ecosystem. For example, primates often perform a primary role in seed dispersal. Loss of such species will reduce seed dispersal, which, in the long term, will affect forest composition.



BARBARY MACAQUE OPENLY ON SALE IN MARRAKECH (PLACE JMA FNAA).

RONALD TROOSTWIJK

The disappearance of the Barbary Macaque in the Middle Atlas would be a great loss to the world's biodiversity, being the only macaque species outside Asia. Apart from ecological consequences, its disappearance could also affect the economic situation in Morocco. As in Gibraltar, Barbary Macaques attract a large number of tourists every year (pers. obs.; Eaux et Forêts, 2004, pers. comm.) and it can be expected that the disappearance of this population and its habitat would affect tourism.

The results of this research show that immediate action is required to put a halt to the poaching of Barbary Macaque infants to prevent this species from disappearing from the scarce natural areas where they can still be found.

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