



Conservation strategy and action plan for Cuvier's gazelle (*Gazella cuvieri*) in North Africa

2017-2026



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Foreword

Strategic conservation planning is a priority for the IUCN Species Survival Commission, as it allows us to invest our limited resources wisely and where their impact is highest. The SSC Mandate for 2017-2020 calls for an increase in planning across SSC and seeks to contribute to the achievement of the Convention on Biological Diversity's Aichi Target 12 on preventing the extinction of threatened species. The process that we encourage aims at designing targets that are SMART – Specific, Measurable, Achievable, Realistic, Time-bound – and at being inclusive, so that all stakeholders sit together to work out the plan, and devise a process for implementing it.

This Cuvier's Gazelle Conservation Strategy and Action Plan embraces this spirit, as it derives from a long-term programme of cooperation between the IUCN Centre for Mediterranean Cooperation and the three countries of the Maghreb. The strategy was developed with the IUCN/SSC Antelope Specialist Group, as well as the three government conservation agencies and many regional and international experts.

The best knowledge and latest information on the status of the species, emerging from the workshops, was incorporated into the IUCN Red List of Threatened Species and is now available to anyone interested.

I am grateful to the IUCN Centre for Mediterranean Cooperation for organizing the workshop and overseeing the process, as well as to all the participants for committing the necessary time and energy to the preparation and production of this strategy.

A major role for SSC is to inform conservation policy processes by making the best science available to the public, but it is ultimately the policy makers who translate the data into actions that lead to species conservation. I encourage all responsible government agencies, working hand in hand with academia, civil society and the private sector to examine the recommendations summarized in this document and put them to practice.

Jon Paul Rodríguez

CHAIR

IUCN Species Survival Commission

Foreword

North Africa, situated in the Mediterranean Basin biodiversity hotspot, is home to several remarkable endemic and highly emblematic species such as Cuvier's gazelle.

The range of this gazelle that is currently threatened extends across Morocco, Algeria and Tunisia, where it faces common threats, in particular poaching and habitat loss. These shared challenges underline the importance of encouraging joint efforts to overcome them in an effective, lasting manner. And this collaborative spirit is at the very heart of the IUCN Centre for Mediterranean Cooperation's (IUCN-Med) mission.

Since 2012, IUCN-Med has been collaborating with these three North African countries in order to develop a regional conservation strategy for Cuvier's gazelle. The first phase of the project, in which over 75 people participated, focused on capacity-building in strategic planning issues for the conservation of endangered species and the exchange of experiences. In a second phase, the representatives of each country worked together in order to put the knowledge gained into practice and to develop a national conservation strategy for a threatened species. Thus, Morocco has published its great bustard conservation strategy, Algeria is focusing on the Barbary ape and Tunisia on the Barbary sheep. At the same time, the conservation strategy for Cuvier's gazelle was the result of transboundary and international cooperation, which brought together professionals, national authorities and scientists from these three countries as well as international experts from IUCN with a common goal: to safeguard this gazelle endemic to North Africa. Indeed, the development of this conservation strategy would not have been possible without the involvement and active coordination of our national partners, in particular: Morocco's High Commission for Water, Forests and the Fight against Desertification (HCEFLCD), Algeria's Directorate-General of Forests, Tunisia's Directorate-General of Forests Direction, the Tunisian Ministry of the Environment, and scientific experts from the IUCN Antelope Specialist Group (ASG), the Species Survival Commission (SSC), the Experimental Station of Arid Zones (EEZA-CSIC, Spain), and other Mediterranean research institutes.

The focus should now be on the implementation of the conservation priorities identified in the conservation strategy, in line with the context of the Convention on the Conservation of Migratory Species of Wild Animals (CMS) and its Sahe-lo-Saharan Antelope programme. To that end, coordinated efforts between the governmental and non-governmental organisations and conservation organisations will be essential in order to implement the required recommendations on protection and management, so as to ensure the long-term survival of Cuvier's gazelle.



Antonio Troya

DIRECTOR

IUCN Centre for Mediterranean Cooperation



Summary

➤ Cuvier's gazelle (*Gazella cuvieri*) is a species endemic to North Africa, with its distribution being limited to Morocco, Algeria and Tunisia. The species is listed on CITES Appendix I and CMS Appendix I, within the framework of which the CMS Sahelo-Saharan Antelopes Action Plan was developed. Since it was created, this strategy has aimed to follow the abovementioned regional Action Plan and to become a tool for its implementation in order to protect this gazelle.

Cuvier's gazelle is currently globally threatened and is classified as Vulnerable in IUCN's Red List of Threatened Species, mainly due to its small population size. The major threats facing this species are poaching and habitat degradation. Faced with this situation and in order to counter this trend, a strategy and an action plan for this species' conservation in North Africa were developed with the extensive collaboration of stakeholders, in particular: the national authorities in charge of wildlife conservation in three countries (in Morocco, the High Commission for Water, Forests and the Fight against Desertification; in Algeria, the Directorate-General of Forests of Algeria; and in Tunisia, the Directorate-General of Forests and the Ministry of Local Affairs and the Environment), the IUCN Antelope Specialist Group, national experts and NGO members. Thus, around 30 experts, managers and technicians in the field of conservation contributed to this work.

With this in mind, the aim of this strategy is to ensure that by 2050 there are viable, connected populations of Cuvier's gazelle, occupying natural habitats in an area close to its historic range. In order to achieve this goal, drawn up by the main stakeholders in the three North African countries involved, seven intervention strategies were identified: (i) the protection and recovery of populations, (ii) the protection and management of the habitat, (iii) awareness raising and valorisation, (iv) research and monitoring, (v) international cooperation, (vi) capacity building and (vii) captive breeding and management. Each State then adapted these strategies and defined a purpose for its territory, supported by short-, medium- and long-term activities.

The success of this strategy is closely linked to the work by several stakeholders at different levels where each one must act in collaboration with various institutions in order to accomplish these goals effectively.

Cuvier's gazelle male.
Photo © A. Jebali



Acknowledgements

This action plan required the participation of a certain number of individuals and organisations who devoted time and resources to allow for its launching, drafting and publication. The IUCN Centre for Mediterranean Cooperation coordinated this process, led by Violeta Barrios, and supported by Catherine Numa. A key event was the workshop for stakeholders, which that was facilitated by David Mallon in Agadir in October 2015. We would like to thank all the participants, including the international experts and members of government agencies (see list in Appendix I) for their active and constructive contributions.

We thank Koen de Smet and also Teresa Abáigar, Mar Cano and Abdelkader Jebali for all the hard work they put in preparing the *Species Status Review*. We would also like to thank the two proof-readers who made relevant and constructive comments, greatly improving the final version of this document. The development of this action plan would not have been possible without the involvement and active collaboration of Morocco's High Commission for Water, Forests and the Fight against Desertification, Algeria's Directorate-General of Forests, and National Agency for Nature Conservation and Tunisia's Directorate-General of Forests. These institutions are clearly devoted to the conservation of Cuvier's gazelle in order to ensure that its population does not continue to decline in the region, and they will no doubt play a key role in the implementation of this action plan. Finally, the IUCN Centre for Mediterranean Cooperation would like to thank all the experts who participated in the different stages of this strategy, giving up their time and sharing their knowledge and experience. It would also like to thank the MAVA Foundation for providing the funding.



Acronyms

ANN	Agence Nationale pour la Conservation de la Nature [National Agency for Nature Conservation] (Algeria)
ASG	Antelope Specialist Group
CIBIO	Centro de Investigação em Biodiversidade e Recursos Genéticos [Centre for Research into Biodiversity and Genetic Resources] (Portugal)
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMS	Convention on the Conservation of Migratory Species of Wild Animals
CRDA	Commissariat régional de développement agricole [Regional Commission for agricultural development] (Tunisia)
CSIC	Consejo Superior de Investigaciones Científicas [Spanish National Research Council] (Spain)
DGF	Direction Générale des Forêts [Directorate-General of Forests]
ECWP	Emirates Center for Wildlife Propagation
EEZA	Estación Experimental de Zonas Áridas [Experimental Station of Arid Zones] (Almeria, Spain)
EIA	Environmental Impact Assessment
HCEFLCD	Haut Commissariat aux Eaux et Forêts et à la Lutte Contre la Désertification [High Commission for Water, Forests and the Fight against Desertification] (Morocco)
IUCN	International Union for Conservation of Nature
IUCN-Med	IUCN Centre for Mediterranean Cooperation
MAPAMA	Ministerio de Agricultura y Pesca, Alimentación y Medio Ambiente [Ministry of Agriculture, Fisheries, Food and the Environment] (Spain)
MAPM	Ministère de l'Agriculture et de la Pêche Maritime [Ministry of Agriculture and Maritime Fisheries] (Morocco)
MESRS	Ministère de l'Enseignement Supérieur et de la Recherche Scientifique [Ministry of Higher Education and Scientific Research] (Algeria)
NGO	Non-Governmental Organisation
NP	National Park
PA	Protected Area
SCPSC	Species Conservation Planning Sub-Committee
SCS	Species Conservation Strategy
SG	Specialist Group
SIMBIOE	Sociedad para la Investigación y Monitoreo de la Biodiversidad Ecuatoriana [Ecuadorian Biodiversity Research and Monitoring Society]
SSC	Species Survival Commission

1. Introduction

Within the framework of the “Improving capacity for species conservation in the Mediterranean region” project, the IUCN Centre for Mediterranean Cooperation (IUCN-Med) encouraged the sharing of knowledge and experience to prepare species conservation strategies and for the implementation of the appropriate conservation measures at national and regional levels to protect threatened species in the Maghreb region.

Thus, during the launch of this regional initiative, Cuvier’s gazelle (*Gazella cuvieri*), a threatened species endemic to the Maghreb, was selected as one of the priority species. In this context, two workshops were organised to draw up a regional conservation strategy for the species.

The first workshop was held in Almeria (Spain) on 14 and 15 November 2013 and served to set the process in motion. Over 15 experts from the field of science, representatives of the competent administrations and civil society, as well as the scientific and technical director of the CMS, participated actively in the definition of a roadmap for developing a regional conservation strategy. The workshop was organised by the IUCN Centre for Mediterranean Cooperation and the Experimental Station of Arid Zones (EEZA-CSIC, Spain).

In the months that followed, a draft version of the state of knowledge of this species’ current status in North Africa was drawn up and disseminated for review and validation by all the experts and stakeholders.

A second workshop was held with the stakeholders in Agadir (Morocco) from 26-28 October 2015, in order to develop a strategy to conserve Cuvier’s gazelle. This workshop consisted of presentations, task forces and discussions. Twenty-eight participants were present (see list in Appendix I), including representatives from the IUCN Centre for Mediterranean Cooperation and the co-chair of the IUCN Species Survival Commission’s Antelope Specialist Group (ASG), who facilitated the workshop.

The methodology followed was that of the IUCN Species Conservation Planning Sub-Committee (2008). During this workshop, the participants drew up a “Vision”, “Goals”, objectives and actions to carry out in order to establish the key parts of a Strategy and Action Plan for this species. The workshop was organised by the IUCN Centre for Mediterranean Cooperation and Morocco’s High Commission for Water, Forests and the Fight against Desertification.

This document presents the results of this multinational, multidisciplinary, collaborative work and comprises two main parts. The first part (Section 2) summarises the current state of knowledge on Cuvier’s gazelle in North Africa. The second part (Sections 3 and 4) covers the results of the workshops organised in order to define the priority actions for this species in the future.

2. Status review

2.1. TAXONOMY AND NOMENCLATURE

Cuvier's gazelle is a species endemic to north-west North Africa.

Classification	
Class	Mammals (Mammalia)
Order	Cetartiodactyla
Family	Bovids (Bovidae)
Genus	<i>Gazella</i> (de Blainville, 1816)
Species	<i>Gazella cuvieri</i> (Ogilby, 1841)



Gazella cuvieri. Photo © Teresa Abáigar/CSIC

Common names	
Arab and Amazigh	الآدم، غزال الأطلس، الغزال الجبلي Edmi, Ledm or Edem (eastern and western Algeria and western Tunisia), Dama (eastern Morocco), Harmouch, Gen. sing.; LeHaramich, Gen. plur.; Tteys Iharmouch and Laafer Iharmouch (male), 'Anz Iharmouch, female, (Tekna, south-west Morocco), Ed Ddami, (Rguibat) (Monteil, 1951), Aharmouch (Amazirh, south-west Morocco) (Cuzin, 2003), Amlal and Asguin (south-east Morocco) (Cuzin, 2003), Harmouch (Tiaret, Algeria), Ghazel (Relizane, north of Tiaret), Harmush (Atlantic Sahara) (Valverde, 1957).
French	Gazelle de Cuvier, Gazelle de l'Atlas, Gazelle de Montagne.
English	Cuvier's Gazelle, Edmi Gazelle, Edmi, Atlas Gazelle.
Spanish	Gacela de Cuvier, Jarmús (Morales-Agacino, 1949).

2.2. PHYSICAL CHARACTERISTICS

This is a medium-sized gazelle, characterised by the wide light and dark brown bands that run along the animal's sides, its white ventral parts and hindquarters, and its black tail. It has a prominent black spot on the bridge of its nose. Its face has clear striping and the ears are long, pale and narrow. The horns are long (25-37 cm) and are annulated in adults of both sexes. They rise vertically before diverging outwards and backwards; the smooth tips curve gently inwards and forwards. Their heights at the withers and the hindquarters are similar. The female is smaller than the male (the average weight of a female = 26.4 kg, and that of a male = 32.6 kg; Moreno & Espeso, 2008).

2.3. REPRODUCTION

In the wild, in the Anti-Atlas, rutting behaviour was observed in November 2016, one week after the rains. In this case, it led to young being born at the end of May (F. Cuzin, pers. obs., 2017). Breeding behaviour in the wild may thus be triggered by the availability of food, in other words be linked to the rains.

Given the lack of studies of the wild population, the data presented below correspond to studies carried out on captive Cuvier's gazelles.

In captivity, young are born all year round, but a peak in births has been observed in the spring and a secondary peak in autumn, which could be linked to the Mediterranean climate. These peaks occur in March-April and October-November, according to Olmedo *et al.* (1985), and in February-April and September-October according to Abáigar and Cano (2005). The female Cuvier's gazelle can reach sexual maturity when she is 26 or 27 weeks old (185 days or 6 months) and can give birth to her first young at the age of 13 months (Moreno & Espeso, 2008), with a variation of 344-828 days (Olmedo *et al.*, 1985). However, females born in autumn give birth in their second spring (average age 489 days, range: 457-531 days); most of the females born in spring give birth the following spring (average age 329 days, range: 344-439); other females give birth the following spring (average age 746 days, range: 703-828 days).

On average, the gestation period lasts from 161 days (Escós, 1992) to 168 days (Moreno & Espeso, 2008). Only two species of African gazelle, Cuvier's gazelle and the slender-horned gazelle (*Gazella leptoceros*, a closely related species), give birth to twins. Twins are frequent [38.7 % according to Escós 1992, 42% according to Abáigar and Cano (2005), and 39.11 % according to Moreno and Espeso (2008)]. In primiparous females, the proportion of twins is lower than in multiparous females (Olmedo *et al.*, 1985). Three cases of triplet gestation have been recorded in captivity at the Experimental Station of Arid Zones (EEZA-CSIC, Almeria, Spain).

According to Moreno and Espeso (2008), the average weight of a male at birth is 3.91 kg (3-5; $n = 34$) and that of a female is 3.78 kg (2.5-5; $n = 28$). However, according to Huffman (2013) the average weight at birth is 2.995 kg. There is no difference in weight at birth between singlets and twins (Ibañez, 2011).

2.4. BEHAVIOUR

Cuvier's gazelle lives in small groups of 5 to 6 individuals and is sometimes solitary (Cuzin, 2003; Gil-Sánchez *et al.*, 2016). In certain cereal-growing regions and, depending on the season, groups of around forty individuals have been recorded (Bounaceur *et al.*, 2013; Beudels-Jamar *et al.*, 2006). These groups are often harems made up of one adult male and several females accompanied by their young. During the rut, young males are forced to leave their maternal herds and gather in bachelor groups. They may subsequently be joined by males evicted during fights over females. Once formed, the harems will remain together all winter and only separate when the females leave to give birth.

Regarding the variability of its habitat, Cuvier's gazelle's movements have been recorded in Morocco in particular (Cuzin, 2003): some animals are sedentary, whilst others may be nomadic or migratory. On the southern slopes of the High Atlas, this species is capable of ascending to very high altitudes in summer (up to 2,900 m), using protected pastures (*agdals*) until the livestock breeders arrive. In the High and Anti-Atlas Mountains, the gazelles tend to move in a way complementary to the movements of herds of cattle. On the Souss plain, the gazelles moved a total of 18 km to pastures where cattle were not allowed to graze, and grazing bans are frequently exploited by the gazelles. In the Northern Sahara, gazelles from the Aydar moved in winter to the High Sequia El Hamra, where they were absent in the summer. Animals were also recorded arriving in the Lower Drâa a few weeks after rainfall (Cuzin, 2003).

Stipa tenacissima in Mergueb
Nature Reserve, Algeria.
Photo © Teresa Abáigar/CSIC



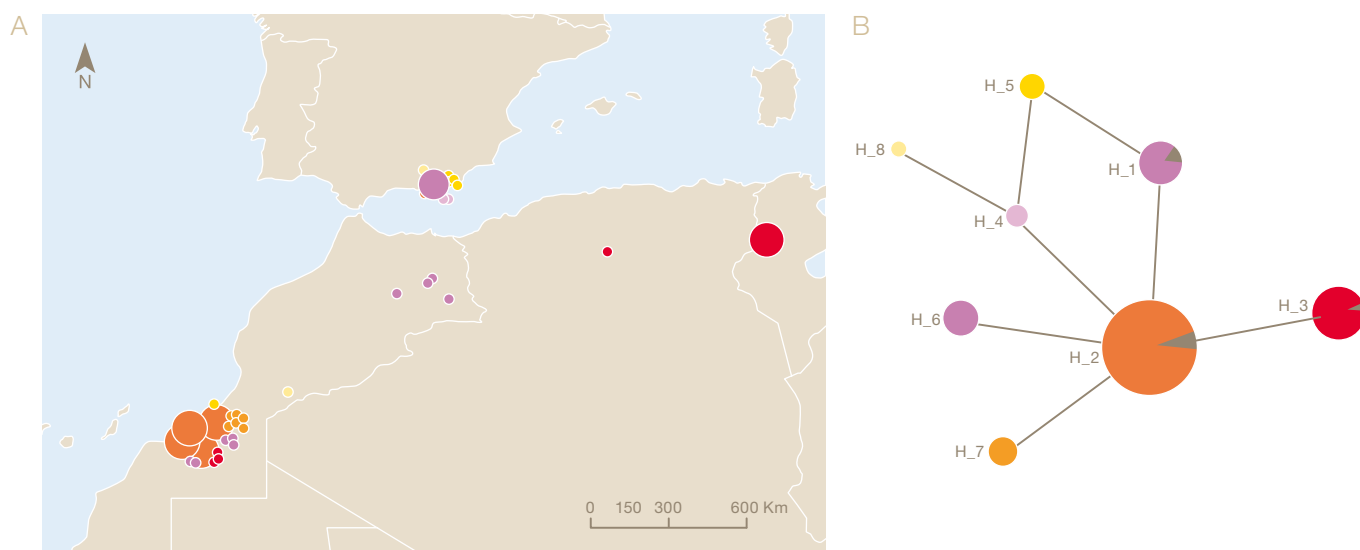
2.5. DIET

Given the diversity of the habitats frequented by Cuvier's gazelle, its diet is very varied. Cuvier's gazelle favours young shoots of alfa grass (*Stipa tenacissima*) (see photo opposite, Mergueb, Algeria), and other grasses (e.g. *Cynodon dactylon*), young leaves of leguminous plants and other perennials (e.g. *Helianthemum lippii*, *Artemisia herba alba*) (De Smet, 1989). In the cereal-growing areas in the north of the Province of Tiaret, in Algeria, the consumption of monocotyledons and dicotyledons is on average almost equal (48% / 52%). However, in spring a high proportion of wheat is consumed (up to 25%) as well as a large amount of "weeds" (dicotyledons) in these fields, and the accompanying monocotyledons such as wild oat and *Stipa* spp. In winter, when the fields are bare, the proportion of *Stipa tenacissima* increases to 10% and they add gymnosperms such as *Pinus halepensis* and *Cupressus* spp. and holm oak (*Quercus ilex*) leaves, and those of other dicotyledons in degraded maquis such as species of *Chamaerops*, *Thymus* and *Artemisia* (Chahrazed & Dhaouia, 2013).

In other pre-desert regions, Cuvier's gazelle is clearly a grazer, with *Acacia raddiana* and *Argania spinosa* being the most abundant species it favours as well as *Chrysopogon aucheri*, *Psoralea bituminosa*, *Periploca laevigata*, *Rhus tripartita*, *Lavandula stricta*, *Nitraria retusa*, *Maerua crassifolia*, *Caylusea hexagyna* and *Asparagus* sp. (Cuzin, 1998; Gil-Sánchez *et al.*, 2016).

The species' water consumption varies depending on the region: frequent in continental regions, it is rarer in oceanic regions, such as in the Lower Drâa (Cuzin, 1998; Gil-Sánchez *et al.*, 2016).

Figure 1. Genetic characterisation of *Gazella cuvieri* populations based on a mitochondrial marker (cytb, 401 pb). A) Haplotype distribution map. B) Haplotype network. Each colour represents a different haplotype. The size of the circles is proportional to the frequency of the haplotypes. The total number of samples analysed was 108 plus 6 GenBank sequences (represented in grey)..



2.6. GENETIC PERSPECTIVE

In a preliminary work, Teresa Luisa Silva (University of Porto) carried out invasive and non-invasive sampling to sequence the mitochondrial and nuclear markers of the various known populations (wild, semi-captive and captive) of *Gazella cuvieri* within the species' range. This enabled several interesting points for discussion to be identified (Figure 1).

The preliminary results show that the wild populations of Cuvier's gazelle in Morocco and the captive population at the Experimental Station of Arid Zones (EEZA-CSIC), Almeria, Spain) present the highest levels of genetic diversity, but that the haplotypes are closely linked to one another. Insufficient sampling has been carried out in Algeria. In Tunisia, the samples come from four different wild populations but may reflect the diversity of a single founder population. However, the results of the nuclear markers reveal that there is no population structure across the species' range. In other words, there are no different haplotypes in all the animals occurring in the region. This thus indicates that Cuvier's gazelles are similar across their entire range in North Africa. In short, it is important to highlight the fact that the genetic variability is well distributed across the entire wild population (in particular in Morocco). In the future, the structure of the populations should be further clarified (using detailed nuclear markers) and more in-depth studies should be carried out in Tunisia and Algeria, in order to gain a greater understanding of the gene flow in this species. In Algeria, genetic studies carried out by a local team (Derouiche *et al.*, in preparation), in collaboration with specialised European laboratories, have already been launched and will cover all the recently described natural populations of this antelope (Bounaceur *et al.*, 2016).

The genus *Gazella* includes taxa with distinct morphologies and ecological traits, but close phylogenetic relationships (Hammond *et al.*, 2001, Bärmann *et al.*, 2012). *Gazella cuvieri* and *G. leptoceros* share morphological and physiological characteristics, but the former is darker and is found in mountainous areas, whilst the latter is lighter and associated with sand dunes. Phylogenetic analyses based on mitochondrial and nuclear gene fragments show that the two taxa form a single monophyletic group. Ecological analyses show that the populations of these taxa occupy distinct geographic areas and specific environments. Predicted areas of sympatry are restricted, due to more marked local transitions in climatic traits. The absence of genetic differentiation between these taxa suggests that they should be lumped together in *G. cuvieri*, whilst the ecological and morphological differences indicate that they correspond to distinct ecotypes. The conservation planning for *G. cuvieri* should consider the preservation of mountain and lowland ecotypes in order to maintain the overall adaptive potential of the species (Silva *et al.*, 2017).

2.7. HABITATS

Cuvier's gazelle appears to be associated with the middle and lower slopes of the uplands of the Maghreb. It occurs from sea level to altitudes of up to 2,900 m. Although it mainly lives in hills and low mountains, individuals have been observed on piedmont plains. Interestingly, it is also capable of inhabiting very steep slopes (up to 45°). This species is known for its tendency to avoid snow-covered areas, and only frequents high altitudes in summer (Cuzin, 2003; Beudels-Jamar *et al.*, 2006).

It occupies relatively dry forests of semi-arid Mediterranean type, dominated by *Pinus halepensis*, *Juniperus phoenicia*, *Tetraclinis articulata*, *Quercus ilex*, *Argania spinosa* and perhaps, before they were destroyed, *Olea europaea* with an undergrowth of maquis or garrigue, which can be relatively thick or relatively open, and often includes *Rosmarinus officinalis*, *Phyllirea angustifolia*, *Globularia alypum* (Cuzin, 2003; Beudels-Jamar *et al.*, 2006).

In the arid Mediterranean climate, it also frequents steppes of *Stipa tenacissima* and *Artemisia herba-alba*. These forests were formerly much more widespread and the *Stipa tenacissima* steppes constitute the first stage of substitution. These steppes too are in sharp decline. In the south-west of its range, in the Saharan part, Cuvier's gazelle is associated with trees (*Acacia raddiana*, *Acacia ehrenbergiana* and *Argania spinosa*), except perhaps on the Atlantic coast where it is found in environments with relatively dense bushes (Cuzin, 2003).

In Algeria, Cuvier's gazelle can be found in wheat fields, particularly in the Tiaret-Relizane – Tissemsilt – Mascara – Chlef region, in rolling countryside, on hilltops with the remains of Mediterranean low maquis (with *Chamaerops humilis*), as well as on slopes and in valleys. The species uses wheat fields as feeding grounds, especially in winter and spring. After the harvest, when the nomads settle on the stubble fields, the gazelles move to the remaining maquis and remnants of open forests. In Tiaret a recent study revealed that over 90% of Cuvier's gazelle's habitat is made up of farmland, particularly in Rahouia, Guertoufa and Oued Lili. However, forests account for 80% of its habitat in the forest massifs of Frenda and Takhermert, compared with only 38% in the Nador Mountains (Boualem, 2017).



Gazella cuvieri's habitat in southern Algerian Tell, Wilaya of Tissemsilt.
Photo © Koen de Smet

Cuvier's gazelle habitat
in the Anti-Atlas,
Djebel Guir, Morocco.
Photo © Koen de Smet



2.8. RANGE

Cuvier's gazelle is a species endemic to uplands of the Maghreb, where its range includes the Atlas Mountains and neighbouring ranges in Morocco, Algeria and Tunisia. It also inhabits the plains in western Morocco and the massifs of the Saharan Atlas in Algeria.

2.8.1. Historic range

In **Morocco**, Cuvier's gazelle's range extended across all the mountain ranges (Eastern Rif, High Atlas, Middle Atlas and the Anti-Atlas, pre-Saharan mountains, Aydar south of the Drâa) and the associated plateaux (except for the Western Rif). It reached the Mediterranean and Atlantic coasts in certain locations (e.g. Ben Slimane and the Ajou Mountains). However, during the first half of the 20th century, this distribution diminished considerably. Thus, during the 1930s (or perhaps later), it is thought that Cuvier's gazelle disappeared from the lower Segua El Hamra and, during the 1960s, from the Rabat and Casablanca region. At the same time, it disappeared from the Middle Atlas and several other locations (Cuzin, 2003).

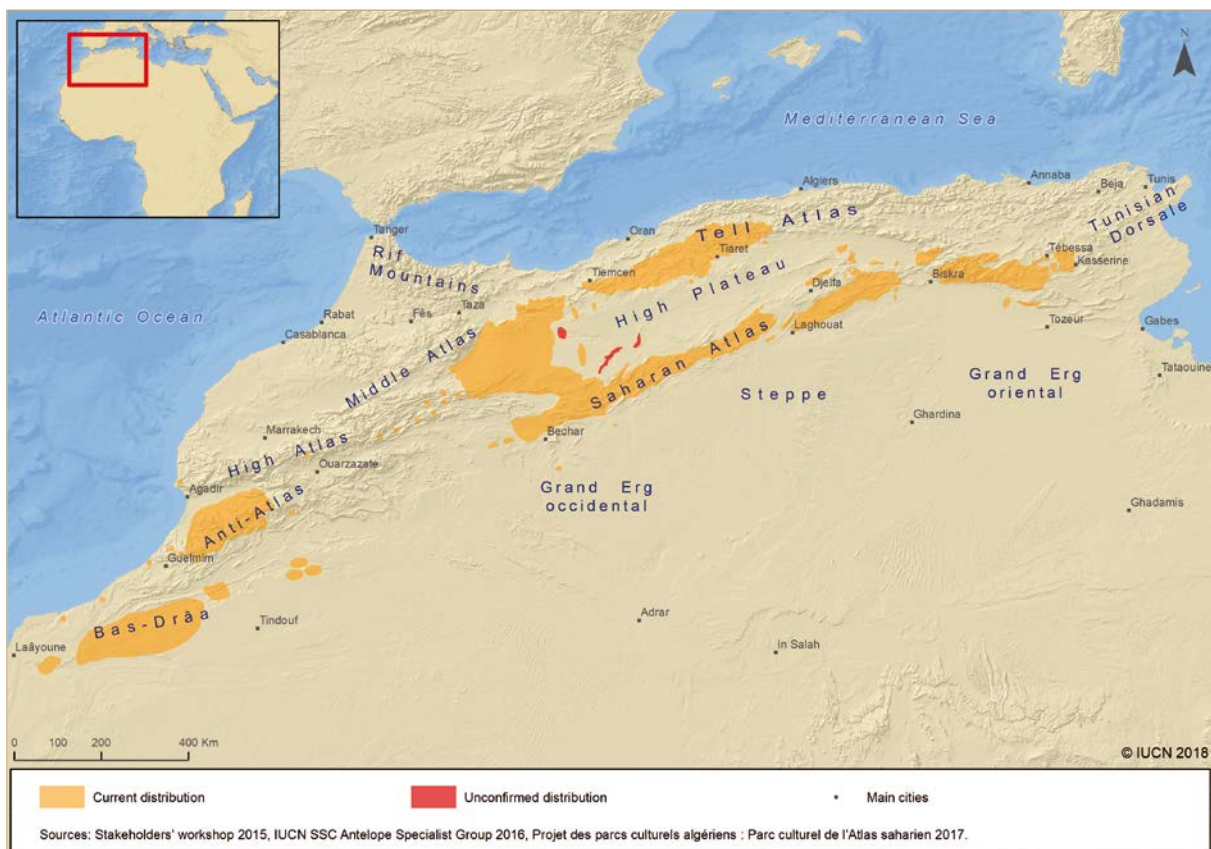
In **Algeria**, Cuvier's gazelle used to occupy the slopes of the Tell range, those of the southernmost massifs formed by the Saharan Atlas and the Ougarta Range, that is 300 km farther south, as well as the massifs in the eastern part of the country covered in open woodland. It has disappeared from the Tell Atlas east of Theniet El Had (but it recently returned to the Theniet El Had National Park; A. Fellous-Djardini, pers. comm. 2017). It was still thought to be present on the Mediterranean coast until around 1930.

In **Tunisia**, Cuvier's gazelle used to occupy the Dorsale up to the Tunis region, as well as the pre-Saharan massifs and even beyond Chott El Djerid notably in the Tabaga Range (Joleaud, 1929; Koller, 1930; Blanc, 1935; Lavauden, 1920; Monchicourt, 1913). It was still quite abundant in 1936 across the entire Tunisian Dorsale from the border with Algeria to Djebel Bou Kornine, 17 km south of Tunis. During the 1970s, the species was only present in the vicinity of Djebel Chambi and Djebel Khchem El Kelb, between Kasserine and the Algerian border. However, local reports claim that Cuvier's gazelle survived east of Tozeur, that is, in today's Dghoumes National Park until 1992 (A. Chetoui, pers. comm, 2017). Erlanger in his account of hunting safaris from 1896 to 1897 reported its presence in the massifs south of the *chotts* (salt lakes) and even the very far south, almost on the border of the Grand Erg Oriental in a landscape where the Barbary sheep is also present on the same peaks.

2.8.2. Current status

This section presents the data currently available on the distribution range of Cuvier's gazelle's wild populations in North Africa over the last twelve or so years.

Figure 2. Cuvier's gazelle's range and the main massifs in North Africa (based on data from the IUCN/SSC Antelope Specialist Group (2016) and on information obtained from national experts during the stakeholders' workshop in 2015).



MOROCCO

In Morocco, there are three large populations in the Lower-Drâa-Aydar region (935 animals, 597-1,607 with a CI of 95%) (Gil-Sanchez *et al.*, 2016), in the western Anti-Atlas (1,000-2,000) (Cuzin, 2015) and in the eastern part of the country, with small, scattered populations (around 300). Hence the estimate of a total of 1,900 to 3,000 individuals in Morocco, with small, scattered groups on the southern slopes and in the eastern part of the High Atlas, in the Saharan Atlas, in the centre and east of the Anti-Atlas and on the southern slopes of the Middle Atlas. In other words, a total estimate of 2,000 to 4,000 animals.

ALGERIA

The list given in the Algerian report (DGF/ANN 2015) indicates the presence of these animals in all the sites where De Smet (1989) had found them. Bounaceur *et al.* (2016) established the range of *Gazella cuvieri* in Algeria between 2012 and 2014 through detailed mapping. The species is present in all the biotopes already described, in 13 *wilayas* (administrative districts), apart from a few areas where it has declined spectacularly because of threats and habitat destruction. The species is abundant in western Algeria, notably in Tiaret, Relizane, Tissemsilt, Sidi Bel Abbès and Béchar.

Cuvier's gazelle is virtually absent from the north-eastern part of coastal zones up to the edges of steppe and arid zones. The limit of its range appears to be located beyond certain latitudes, such as the semi-arid zones and steppes, in particular M'sila, Biskra, southern Batna, southern Khenchela and southern Tébessa in the east. However, in the west, the species seems to be present beyond the Tell Atlas (Chlef and Relizane), in other words 100 km from the northern shores of the Mediterranean, as far as Tiaret and Mascara (across all these areas), and south of Sidi Bel Abbès, Saida and Tlemcen, thus frequenting different habitats.

These recent observations confirmed its presence farther north, in particular in western regions, with very satisfactory numbers, and also in the east of Algeria. Moreover, the data confirm its presence in all the regions indicated, as sites where it has always lived in large numbers, but the sizes of their populations have not yet been estimated. The Directorate-General of Forests is about to start an operation to carry out systematic censuses at all the sites inhabited by this species.

It is thought that the main core population in M'sila, Biskra and Djelfa comes from Djebel Boukhal, which has not yet been explored due to its great size and the fact that it is impossible to access. However, recent reports collected from local populations, of nomads and hunters have confirmed the importance of the populations within this region. During trips to the western region of Biskra, notably on the Chaiba, Sidi Khaled, Doucen and Ras El Miaâd side, locals and hunters have confirmed the species' presence in large numbers along these routes, where a great deal of poaching continues to be carried out in all seasons. Recent studies (Bounaceur *et al.*, 2013) have shown that the species is widespread in vast cereal-growing areas and is abundant in the Tiaret region in particular.

A study carried out at the end of the 1980s estimated the Algerian population of Cuvier's gazelle at 445 individuals. In 1987, De Smet estimated the population at 400 individuals, or even 500, for the entire country. In 1991, he estimated there were 560 individuals, 235 of which were present in the Tell Atlas, 140 in the Saharan Atlas, 135 in the east and 50 in the central group in the Mergueb area (De Smet, 1991). The current situation is not known in detail, but a questionnaire was sent to the *wilayas* included in the species' range, where recent and old observations were reported by forest and protected area conservation officers. The current population is estimated at 500-560 individuals in Algeria according to the Directorate-General of Forests.

TUNISIE

Observations made in 1991 in the Siliana region indicated an advance of the species towards the north-east, mainly based on the main core in the vicinity of the Chambi National Park (T. Abáigar & T.L. Silva, pers. comm, 2012). The table below indicates the historic and most recent presence of Cuvier's gazelle in massifs and hunting reserves in Tunisia.

Table 1. Historic and current presence of Cuvier's gazelle in the massifs and hunting reserves of the Governorate of Kasserine, Tunisia (DGF, 2014). WR = wildlife reserve

Name of massif/hunting reserve	Area	Historic	Current status
Djebel Khchem El Kelb	2,900 ha (WR 300 ha)	Certain	Absent 2012, 2014
Djebel Serraguia	3,000 ha	Present	?
Djebel Gaubeul	3,000 ha	Present	?
Djebel Tamesmida	5,000 ha	Certain	Present
Djebel Dernaia	16,000 ha	Certain	Present
Djebel Chambi	10,000 ha (NP 6,723 ha)	Certain	Present
Djebel Semmama	12,000 ha	Certain	Possible
Djebel Seloum	8,000 ha	Certain	6 indiv. in April 2013
Djebel Es Sif	10,000 ha	Present	?
Djebel Hamra	3,500 ha	Present	?
Djebel Bireno	3,000 ha	Present	Possible
Ain Amara and Ain Bou Driss 1 st Series	3,000 ha	Present	?
Oum Djeddour	3,000 ha	Present	?

In 2003, following the use of the transect method one assessment presented an estimated density of 1.3-1.5 animals per km². The total population was estimated at 60-100 animals (Abáigar *et al.*, 2004). In 2006, Beudels-Jamar *et al.* estimated that there were 300 individuals in the Chambi National Park region. In 2012, the signs of presence were just as high as in 2003, suggesting that the population had been overestimated in 2006 (T. Abáigar, T. Silva, pers. comm., 2015). However, following recent military operations and fires (2013-2014) the numbers remain unknown, and it is not known whether the population has even survived or if the gazelles have dispersed. At present, it is impossible to carry out research inside the park. A project to determine the loss of plant cover in the park by using satellite images has been proposed by the DGF. The range in the region extends beyond the border with Algeria where, east of Tebessa, large numbers of Cuvier's gazelle remain (F. Bounaceur, pers. comm., 2014).

Cuvier's gazelle was reintroduced at the end of 1999 following the transfer of 17 individuals from the Experimental Station of Arid Zones (EEZA-CSIC) in Almeria, Spain. They were sent to Boukornine National Park, where specific facilities were installed to house these animals. After the animals were reintroduced, the first signs were encouraging, notably due to the birth of several individuals. However, this was followed by the sudden death of the entire population. Jebali and Zahzah (2013) analysed this unsuccessful reintroduction project.

In 2015, the DGF (Tunisia) and the EEZA-CSIC (Spain) signed a cooperation protocol for a Cuvier's gazelle reintroduction project in Tunisia. On 18-20 October 2016, a total of 43 gazelles from the Experimental Station of Arid Zones (EEZA-CSIC) in Almeria and Oasis Park Fuerteventura were transferred to Djebel Serj National Park where specific facilities were installed to receive them (<http://rgct.eeza.csic.es/index.html>). This was the first stage of species recovery project in the Dorsale, their former range in Tunisia.

2.9. POPULATION

There are no precise quantitative estimates of the size of the former populations of Cuvier's gazelle, but it was said to be common and locally abundant (e.g., Heim de Balsac, 1936). Harper (1945) quotes Cabrera who in 1932 mentioned that it was particularly numerous in the central part of the Middle Atlas, in the Beni Mguild and Ait Aiach areas, and along the divide between this range and the High Atlas. In 1932, Carpentier reported that it was formerly abundant in the Zaian district near Sidi Lamine and Khenifra (central Morocco).

Beudels-Jamar *et al.* (2006) estimated the total population at 1,450-2,450 individuals, and Mallon and Cuzin (2008) at 1,750-2,950. Following discussions at the workshop, the most recent estimates suggest that the current population consists of 2,360-4,560 individuals, most of which are in Morocco (IUCN/SSC Antelope Specialist Group. 2016). In Morocco and Algeria, the species appears to be prospering and its populations are growing in some regions. In Tunisia, recent events could threaten the recovery of the population in Djebel Chambi National Park and the surrounding massifs.

According to the most recently available data, the captive population of Cuvier's gazelle stood at 219 individuals at the end of 2007; 136 individuals in the European Endangered Species Programme (EEP) and 83 individuals in the American Species Survival Plan (SSP) Programme. At that time, four European bodies participated in the EEP and eight North American institutions took part in the SSP. All the animals included in these programmes are descendants of the first individuals transferred to the EEZA in Almería in 1975 and 1987 from Morocco (Moreno and Espeso, 2008).

Moreover, there are captive Cuvier's gazelles in Morocco, Algeria and Tunisia, as well as in private collections, but the size of these populations is unknown.

2.10. FUNCTIONS AND VALUES OF THE SPECIES

Like all wildlife species, Cuvier's gazelle has intrinsic values, whereby biodiversity should be protected for its own sake, so as to pass on this heritage to future generations.

As one of the largest herbivores Cuvier's gazelle plays an important role in the equilibrium of ecosystems, contributing to ecological functions, the structure of plant cover, the dispersal of seeds and the regeneration of grazing land.

Like all gazelles, Cuvier's gazelle is also well-known for its aesthetic qualities. It is a species that is respected by and popular with the local population (and considered a *marabout*) in the Tiaret region, in north-west Algeria and also in Relizane-Mascara in the Beni Chougran Mountains (F. Bounaceur, pers. comm., 2013). For hunters, it remains a "noble" game species, with horns that can reach lengths of up to 42 cm in the male.

2.11. THREATS

The threats can be divided into two main categories: direct threats (leading to the mortality of the gazelles) and indirect threats (facing the habitat and the environment). In addition to these direct and indirect threats, a certain number of constraints are placed on the conservation of Cuvier's gazelle. These are factors that can influence the capacity and/or will to confront the threats; or they can be the precursors required to reduce the threats. The main current or potential threats identified in 2015 by participants in the stakeholders' workshop for drawing up a strategy were the following (see also the figure in Section 3.2):

- Poaching

According to all the experts consulted, illegal hunting is the main threat facing Cuvier's gazelle. Even if its preferred habitat (as in all other species of North African gazelles), confers the best protection against hunters in vehicles, Cuvier's gazelle is still subject, at least locally, to a great deal of pressure from poaching. However, the extent of this threat varies from country to country, and sometimes even from one region to another within each country.

In **Morocco**, the situation varies by region, and it should be noted that the guarding system practised in western Morocco works well (Hingrat, 2014), as it also does in some hunting concessions (*amodiations de chasse*) in the western Anti-Atlas where the species is respected by the local population. In **Algeria**, although poaching has been identified as a threat, no case of illegal hunting of this species has been reported to date (DGF, 2017). In **Tunisia**, the data on this illegal practice need to be updated. However, the intense pressure placed on the species is palpable.

Some poachers use a breed of local greyhound, the Sloughi, and in Tunisia this animal is protected and officially banned in hunting.

Hunting has also been identified as the main threat facing all species of antelope in North Africa, including Cuvier's gazelle (Mallon & Kingswood, 2001).

- Predation by stray dogs

Stray dogs appear to be present in large numbers in certain parts of Cuvier's gazelle's range, and they constitute a potential threat, in particular for young animals. Landfill sites only help increase the populations of these stray dogs. However, very few cases of gazelle mortality due to dogs have been reported.

- Natural predation

Predation could contribute to the direct mortality of gazelles, but it is a natural factor rather than an anthropogenic threat. Indeed, the impact of the common jackal and the African golden wolf (*Canis aureus* and *Canis anthus*) and other natural predators such as the caracal (*Caracal caracal*), the striped hyaena (*Hyaena hyaena*), foxes (*Vulpes* spp.) and large raptors, on both young and adults is not known.

- Disturbance

The species' reaction to disturbance is very variable. In inhabited areas, the animals are quite tolerant and able to live at distances of under 2 km from small villages and they regularly cross the large local roads and even inhabit wheat fields after the harvest. In desert areas, the animals move away when locals settle there temporarily.

However, even in inhabited areas, the animals tend to choose places where food is plentiful, where there is little disturbance and livestock grazing is forbidden (Beudels-Jamar *et al.*, 2006); the presence of livestock herds, especially goats and sheep, is indeed a disturbance factor that forces gazelles to move away or even use sub-optimal pasture.

- Infectious diseases

The transmission of infectious diseases to Cuvier's gazelle, notably foot-and-mouth disease and *peste des petits ruminants* (PPR) (endemic to the Maghreb) to domestic animals, either through direct contact or by vectorisation, is a potential risk, but the frequency of transfers and the severity of the impacts are unknown, and very limited reliable data are available. In Algeria, a wildlife monitoring healthcare network has been set up and has not reported any diseases in this species. In Tunisia, there is no precise knowledge but notifiable diseases (*peste des petits ruminants*, foot-and-mouth disease, brucellosis, bluetongue, sheep pox, Rift Valley fever) are tested for opportunistically and no case has been reported so far. There are no data on infectious diseases affecting wild specimens of Cuvier's gazelle in Morocco.

- Collisions on roads

Very little information is available on this threat, which is rarely reported. However, in some parts of the species' range, the network of roads and tracks has grown considerably, thereby increasing the potential risk of collisions. No cases have been reported in Algeria.

- Habitat loss and degradation

Habitat degradation and loss are the main indirect threats. They are mainly due to the transformation of wooded zones into pastures and farmland. However, these threats vary from one country to another. In Morocco, overgrazing affects several parts of the country apart from the north-western Sahara and the western Anti-Atlas. In Tunisia and Algeria, on the other hand, overgrazing does not represent a serious threat, at least not at the moment. Numerous other factors influence Cuvier's gazelle's habitat, namely the development of intensive farming and the loss of natural corridors that link the different populations of the species.

- Forest fires

The species is subject to the harmful effects of fires that break out in the marquis and open woodland. In Morocco, the impact of forest fires on this gazelle is considered marginal.

- Fragmentation

In some regions where Cuvier's gazelle's habitat and numbers are limited, subpopulations have become isolated or fragmented and small subpopulations are vulnerable and liable to disappear due to stochastic factors. Threats such as poaching or habitat loss (due to overgrazing by livestock) can therefore have major consequences on the genetic isolation of the populations: demographic risks, excessive genetic drift and inbreeding in isolated populations. There is a major risk of fragmentation of Cuvier's gazelle habitats, separating populations lengthwise between the northern strip (Tell Atlas and the High Plains) and the southern strip (Steppe and Saharan Atlas), due to the construction of the motorway on the East-West High Plateaux.

- Climate change

Climate change is one of the global change factors currently threatening biodiversity, as is the growth in the planet's human population, which is placing a great deal of pressure on the environment, especially in rural areas. The lack of data from the study area means it is not possible to quantify precisely the regional impact of climate change. However, the species is known for inhabiting arid areas and for its seasonal movements (migrations), which suggests that it could adapt to climate change better than other taxa.

2.11.1 Constraints

The main constraints identified during the workshop are listed below:

- Lack of knowledge about the species

Several cases of a lack of precise data have been identified, in particular concerning population size, trends, the connectivity between subpopulations and certain aspects of the species' biology and ecology.

- Lack of resources

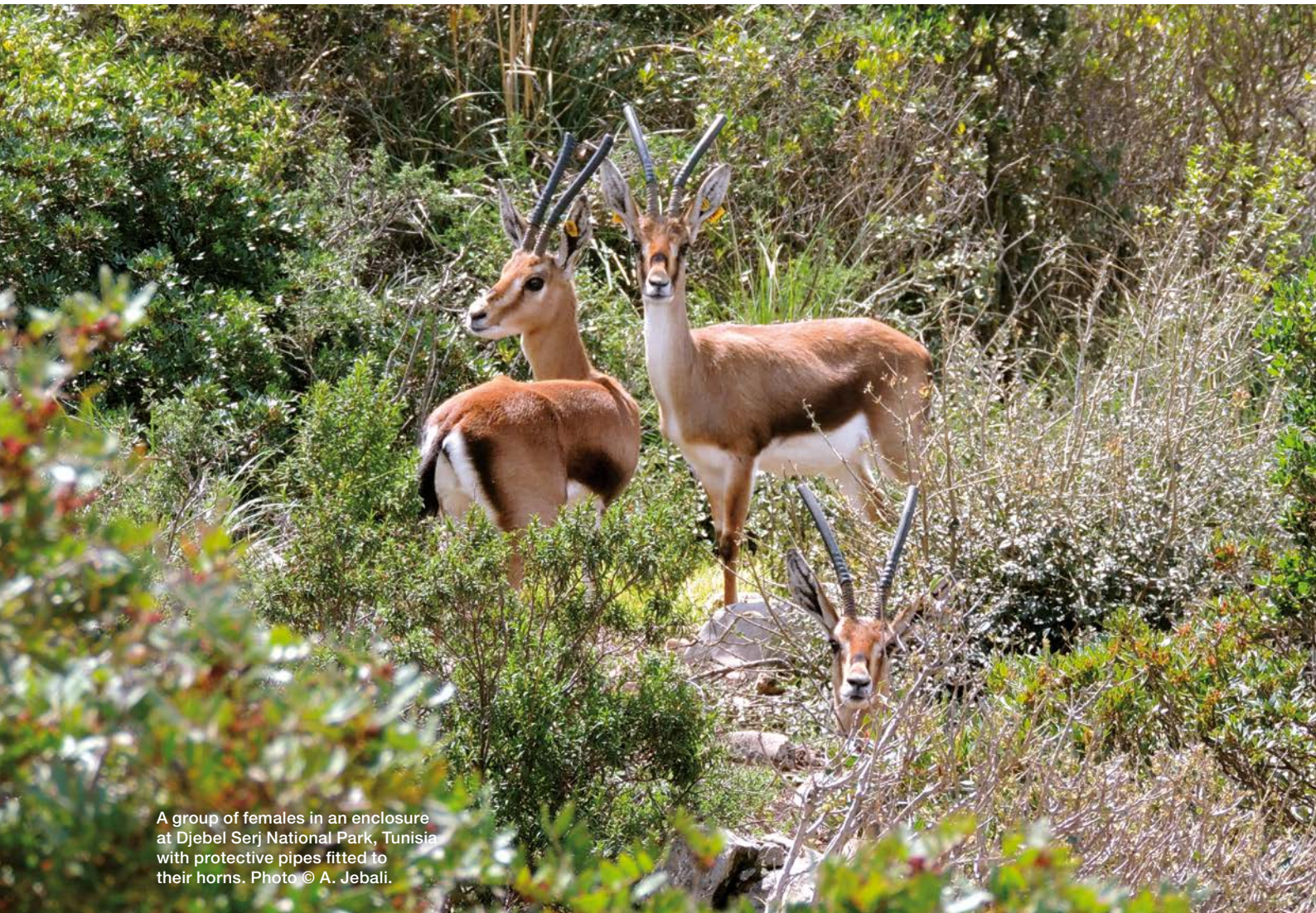
The lack of available human and financial resources for the conservation of Cuvier's gazelle (as well as other species) prevents the implementation of conservation strategies. The failure to appreciate the value of biodiversity in general plays a key role in this respect.

- Need for improved training of managers

The lack of specific training for management staff, especially technical training, has a negative effect on the census and monitoring of Cuvier's gazelle.

- Lack of effective law enforcement

The legislative frameworks in the three countries of the species' range are adequate. However, the lack of respect for laws and the lack of effective law enforcement in the field make these frameworks ineffective in practice.



A group of females in an enclosure at Jebel Serj National Park, Tunisia with protective pipes fitted to their horns. Photo © A. Jebali.

- Absence of biodiversity valorisation

Raising people's awareness of the endemic character and the threatened status of Cuvier's gazelle could be helpful, within the context of conservation campaigns and the awareness of the species' status.

- Limited integrated planning

The need for conservation planning, as well as the monitoring of and research into Cuvier's gazelle and its habitat has been identified and should be made possible by the adoption and implementation of this strategy.

- Insecurity

Social and political instability in some areas of the gazelle's range in Tunisia could prevent management and research, and even have a direct impact on the species and its habitat.

- Captive population

The following threats to captive populations have been identified: barriers (veterinary, legal) affecting the exchange of animals between countries, insufficient resources for managing the captive populations, and a lack of guidelines in French or Arabic.

2.12. CONSERVATION STATUS AND LEGAL FRAMEWORK

2.12.1. Conservation status at global and national levels

Cuvier's gazelle is classified as Vulnerable in the IUCN Red List (IUCN/SSC Antelope Specialist Group [ASG], 2016).

In Morocco, this gazelle is considered “endangered” (Cuzin *et al.*, 2007). In Algeria, the species remains a “threatened” taxon. However, the drawing up of a national red list in the near future will identify the exact status of Cuvier's gazelle in this country. In Tunisia, the species may be considered “endangered”, although the country does not have a national Red List. The species only remains in Chambi National Park and the surrounding hills, as well as in captivity in Djebel Serj National Park.

2.12.2 Legal framework

Cuvier's gazelle is a highly protected species from a legal standpoint, both internationally and through the legislations of these three countries in the Maghreb.

AT AN INTERNATIONAL LEVEL

Cuvier's gazelle was listed on Appendix I of CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) during CoP 14 to CITES in The Hague in 2007. Appendix I includes species threatened with extinction and that could be affected by trade. Trade in specimens of these species is permitted only in exceptional circumstances (Article II of the Convention). The three countries (Morocco, Algeria and Tunisia) are signatories to this international convention.

Cuvier's gazelle is also listed in CMS (Convention on the Conservation of Migratory Species of Wild Animals) Appendix I, which lists migratory species that are in danger and that the signatory States, Morocco, Algeria and Tunisia, have committed to conserve.

In 2001, the IUCN/SSC Antelope Specialist Group (ASG) published a regional action plan for the conservation of antelopes in North Africa, the Middle East and Asia¹. This publication sums up the efforts made by ASG compiling data on the status of each antelope species in all countries in their range, and developing regional action plans for antelope conservation. For each of the 37 countries covered by the report, including Morocco, Algeria and Tunisia, this provided an overview of their conservation status as well as a summary of the main conservation measures undertaken to protect antelope populations, and proposed conservation measures are also listed (Mallon & Kingswood, 2001).

AT A NATIONAL LEVEL

In **Morocco**, Cuvier's gazelle is classed as a protected species by national legislation, and therefore its capture, possession, hunting and sale are prohibited. It is protected by the law on the conservation of wild flora and fauna and the control of their trade (Law 29-05, adopted in 2011), as well as by the law that controls hunting (Dahir, 21 July 1923 on the hunting policy).

In **Algeria**, Cuvier's gazelle is on the endangered animal species, under Law 06-14 of 14 November 2006 approving Ordinance 06-05 of 15 July 2006, on the protection and preservation of certain threatened animal species, which prohibits the hunting of these species by any means. The capture, possession, transport, naturalisation and commercialisation of endangered animals or parts of endangered animals are also forbidden, and these animals include Cuvier's gazelle. The conditions laid down law only authorise the capture of animals classified as being endangered exclusively for the purpose of scientific research or breeding for reintroduction into the wild, or possession by establishments where the animals are presented to the public. Moreover, Algeria ensures the strict enforcement of the law when mixed anti-poaching systems (Forestry workers and Police) have been established.

In **Tunisia**, Cuvier's gazelle is included in the list of rare and endangered species of flora and fauna, in accordance with the Decree of the Minister of Agriculture and Hydraulic Resources of 19 July 2006. Moreover, hunting of the species is prohibited all year round and across the whole country.

¹ Available on: <https://portals.iucn.org/library/sites/library/files/documents/2001-024.pdf>

2.12.3. Conservation measures and/or initiatives implemented

In 1998, with the support of the countries in the Sahelo-Saharan area, the CMS drew up an action plan for Sahelo-Saharan antelopes, known as the Djerba Action Plan. Within the framework of this action plan, CMS published a series of works in order to present in a precise and detailed manner the taxonomy, biology, conservation status, threats, legislation, conservation and research activities regarding the six species targeted, including Cuvier's gazelle, for example, the Publication Technique No. 11 [Technical Publication No. 11] published in 2006². A new version of this publication is being prepared.

This document also identifies key opportunities for improving the conservation status of antelopes and other biodiversity resources, and for addressing the threats. Among these conservation measures, the following are worthy of note:

- The guarantee of the adequate protection of the species, in particular through the **creation of a dense network of reserves** allowing the species to disperse and redeploy. The development of other hunting reserves, based on the Khchem El Kelb model in Tunisia, should thus allow other sites to play their role of stepping-stones effectively, especially between the Chambi and Boukornine National Parks in the Tunisian Dorsale, but also elsewhere in the species' range.
- **The monitoring of residual populations** and the study of their ecological requirements. It seems that on a whole these populations are well known and relatively well monitored: methodologies to ensure the monitoring of population trends should be developed and applied.
- The reinforcement of populations and **reintroduction** into the potential range. Measures have been proposed that make it possible to speed up the repopulation of the former distribution range through the reinforcement of populations based on individuals born in captivity. The latter proposal would only make sense within a global protection strategy for the species, if the connections between sites are ensured and made permanent.

In line with this strategy developed by CMS, Morocco and Tunisia have developed national strategies for the conservation of wild ungulates. In Algeria, the development of this strategy is included in the five-year plan 2015-2010.

In **Morocco**, the National Strategy for the Conservation of Ungulates was drawn up in 2007 and focuses on seven species: dorcas gazelle, Cuvier's gazelle, dama gazelle, scimitar-horned oryx, addax, Barbary sheep and Barbary red deer (*Cervus elaphus barbarus*). The general strategy proposes a series of activities grouped by strategic objectives, which must all be carried out individually in order to achieve a long-term vision, with a (15-year) schedule and an indicative budget. Management strategies define specific recommendations and actions for each target species (Cuzin *et al.*, 2007). The general objectives of this Moroccan strategy for Cuvier's gazelle are: to safeguard populations in situ, to carry out a global genetic study of the conservation units, to establish two well-managed captive groups, to establish two monitored protected areas (High Moulouya and Saharan Atlas), and to evaluate the feasibility of reintroductions in Amassine and Tizguine. Priorities, recommendations and precise actions for localities containing wild populations of Cuvier's gazelle have also been described, and also for enclosures. After the Guidelines were drawn up, the population in the Amassine Reserve died out and a reintroduction project is planned on the Central Plateau, in Tergou (Cuzin, 2015).

Other conservation projects implemented in Morocco include taking Cuvier's gazelles into captivity or semi-captivity. In order to do this, several enclosures were created, and both their current condition and the animals kept in them need to be assessed.

² Available on: www.naturevivante.org/documents/antilopes_sahelosahariennes.pdf



Young Cuvier's gazelle at Djebel
Serj National Park, Tunisia.
Photo ©Eulalia Moreno-CSIC

In **Algeria**, the five-year plan 2015-2020 foresees the breeding of Cuvier's gazelle by the Centre Cynégétique de Tlemcen (Tlemcen Hunting Centre), in order to reintroduce them into certain protected areas at a later date. The operations could constitute actual reintroduction or reinforcement actions. In this respect, a rehabilitation programme for Cuvier's gazelle in captivity was launched, as part of which the Tlemcen Hunting Centre, designed as a national focal point, acquired a core population of over 22 individuals from different *wilayas*: M'sila, Biskra and Tiaret. Later, births were recorded there and currently the total number of gazelles bred in this centre amounts to 30 individuals (DGF, pers. comm., 2017).

When a reliable core population of Cuvier's gazelle is formed, pre-release operations will be carried out in larger sites, notably in the Tlemcen and Mascara hunting reserves, which are equipped with suitable infrastructures, in order to then start operations for reintroducing the species into its natural habitat.

In **Tunisia**, the regions frequented by Cuvier's gazelle have been turned into hunting reserves since 1974. Only wild boar and jackals can be hunted there in winter, controlled by the forestry authorities. In 1975, a 300-ha conservation reserve, fenced on 3 sides (8 km), was set up for Cuvier's gazelle in a valley on the southern slopes of Djebel Khchem El Kelb. One part of the ridge side was left open to allow gazelles to pass freely (Hadj Kacem *et al.*, 1994).

Chambi National Park (6,723 ha) was created in 1980. A 62-km wildlife permeable fence was set up around the park, in order to allow Cuvier's gazelle to move into it easily. Moreover, a 36-m³-water cistern was built in 1982, on a slope within the Khchem El Kelb reserve. The cistern is filled by the winter rains. In the reserve, other modifications were carried out in order to attract the gazelles. For example, fire breaks were created, troughs were set out to provide supplementary food in times of scarcity (concentrate cattle feed), mineral licks were provided and spineless cacti plots were planted. The gazelles like to graze on the spineless cacti; their water-filled pads supply them with extra water and calcium in summer. Over 18 Cuvier's gazelles, striped hyaenas (*Hyaena hyaena*) as well as hundreds of birds (crossbills, etc.) settled in the reserve thanks to the waterhole and specific developments (Hadj Kacem *et al.*, 1994).

The Khchem El Kelb conservation reserve has thus acted as a staging post for Cuvier's gazelles heading towards Chambi National Park. Observations made in 1991 in the Siliana region have shown that these gazelles once again settled in the north-east in the Tunisian Dorsale massif (Hadj Kacem *et al.*, 1994).

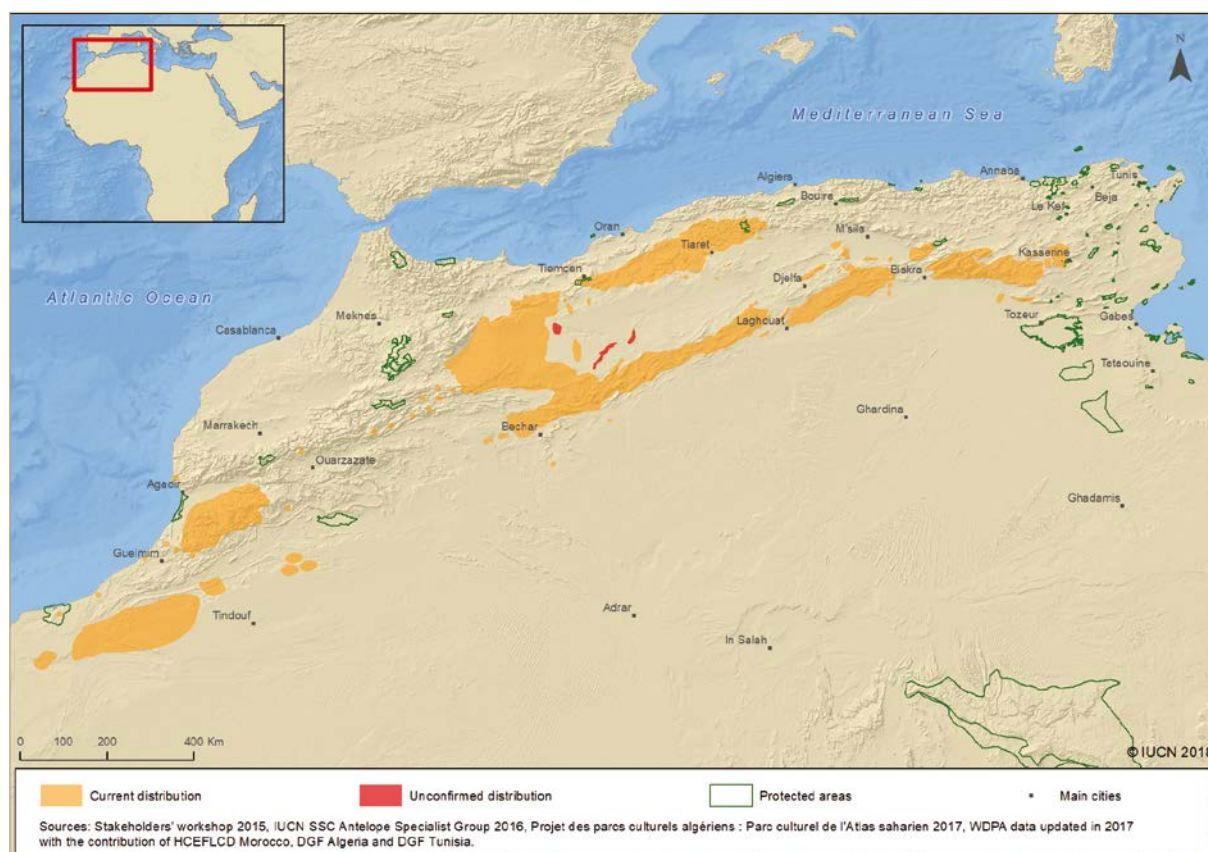
As part of the CMS Sahelo-Saharan Antelope projects, recovery initiatives have been carried out in Tunisia with several species of wild ungulate, including Cuvier's gazelle. All the release operations were preceded by acclimatisation periods for the individuals involved and development work that aimed to restore habitats, in particular action to conserve soil and water, as well as a great deal of work to reconstitute plant cover (Jebali & Zahzah, 2013).

Cuvier's gazelle was reintroduced at the end of 1999 after the transfer of 17 individuals from the Experimental Station of Arid Zones (EEZA-CSIC) in Almeria, Spain. They were sent to Boukornine National Park, where specific facilities were installed in order to receive these animals. After the animals were reintroduced, the first signs were encouraging (Abáigar *et al.*, 2005), notably the birth of several individuals. However, the sudden death of a large percentage of the population means the causes of this "failure" need to be investigated, in order to try to prevent such disappointing results being repeated in the future. In this respect, Tunisia's Directorate-General of Forests ordered a study to be carried out so as to determine the causes of the mortality in the gazelles reintroduced in Tunisia. Jebali and Zahzah (2013) analysed this unsuccessful reintroduction project.

In 2015, the DGF (Tunisia) and the EEZA-CSIC (Spain) signed a cooperation protocol for a Cuvier's gazelle reintroduction project in Tunisia and the first transfer of gazelles took place in October 2016 (see Section 2.8).

Moreover, Tunisia has a Tunisian National Strategy for the Conservation and Recovery of Sahelo-Saharan Antelopes and their Habitats 2001-2020, drawn up by the Directorate-General for Forests and the Ministry of Agriculture, in order to conserve and restore natural ecosystems and their characteristic animal species, notably six species including Cuvier's gazelle. The idea of this strategy was to allow for the repopulation of the entire mountain range between Bou Hedma and Dghoumes National Parks, and the range around these two parks. Figure 3 shows the protected areas in this region.

Figure 3. Map of Cuvier's gazelle's range and protected areas in the Maghreb.



3. Conservation strategy for Cuvier's gazelle in North Africa

The information gathered during the data compilation phase was discussed at the 2015 workshop. The threats were initially identified in a general manner (see Figure 3.2 Problem tree). They were then prioritised and divided into different groups by country, based on the model of a form already used in the region (see Table 3 below). The results of the prioritisation are presented in tables by country (Tables 4-6).

3.1. PRIORITISATION OF THREATS

Geographical scope of the threat	Score	Severity of the threat	Score
The entire zone or population (>90 %)	3	Rapid decline (>30% in 10 years or 3 generations, retaining the longest period)	3
Most of the zone or population (>50-90 %)	2	Moderate decline (10-30% in 10 years or 3 generations)	2
Part of the zone or population (>10-50%)	1	Slow decline (1-10% in 10 years or 3 generations)	1
Small part of the zone or a few individuals (<10%)	0	Non-existent or imperceptible decline (<1% in 10 years)	0

Threat timeframe	Score
Current	3
Likely in the short term (in 4 years)	2
Likely in the long term (in over 4 years)	1
Occurred in the past (return unlikely)	0

The prioritisation indicates that illegal hunting is a major threat that faces Cuvier's gazelle in the three countries, and that forest fires are an equally serious threat in Algeria and Tunisia, but not in Morocco. It should be noted that some of these threats have not been quantified, and are more assumed than proven, or are at least hard to quantify, for example diseases and natural predation. Moreover, the direct impacts of climate change have not yet been studied. In addition, several threats and constraints are closely linked and overlap.

3.2. PROBLEM TREE

Problem tree showing the relationship between the direct and indirect threats facing Cuvier's gazelle.

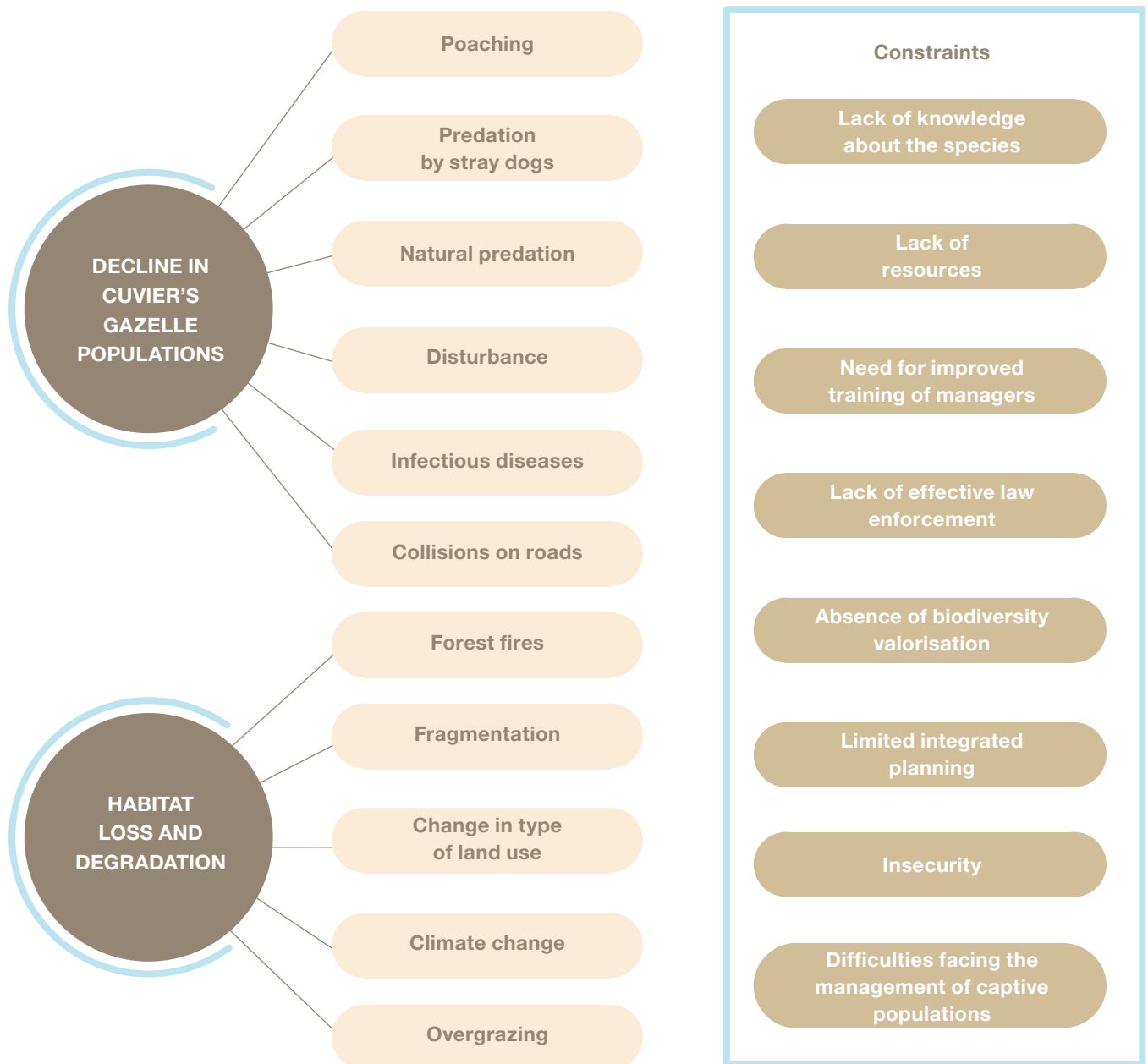


Table 4. Prioritisation of threats : **Morocco**

Threats	SCORE				Comments / clarifications
	2 Scope	3 Severity	3 Timeframe	8 Total	
Poaching	2	3	3	8	Low in the east (l'Oriental), far higher elsewhere
Natural predation	?	?	?	?	Low due to the scarcity of predators
Predation by stray dogs	2	1?	3	6	
Diseases	0	0	1	1	
Collisions on roads	0	0	0	0	Not recorded
Disturbance	1	1	3	5	
Overgrazing	1	1	3	5	Low in the western Anti-Atlas, high elsewhere
Forest fires	0	0	0	0	Not recorded
Fragmentation	0	0	3	3	
Climate change	?	?	?	?	

Table 5. Prioritisation of threats : **Algeria**

Threats	SCORE				Comments / clarifications
	Scope	Severity	Timeframe	Total	
Poaching	2	3	3	8	Measure to deal with the threat implemented
Natural predation	1	1	1	3	Almost non-existent (except in young)
Predation by stray dogs	0	1	0	1	Unidentified impact
Diseases	?	?	?	?	Lack of data on epizootic diseases and others transmitted to Cuvier's gazelle, however, although rarely found, cadavers have not had autopsies performed on them
Collisions on roads	0	0	0	0	Cuvier's gazelle does not frequent areas crossed by roads
Disturbance	3	3	3	9	Low (the species lives at high altitudes)
Overgrazing	2	2	2	6	Low (the species lives at high altitudes)
Forest fires	3	3	3	9	Very high impact
Fragmentation	?	?	?	?	Main cause of its disappearance
Climate change	?	?	?	?	No direct effect on the species

Table 6. Prioritisation of threats : **Tunisia**

Threats	SCORE				Comments / clarifications
	Scope	Severity	Timeframe	Total	
Poaching	0	?	2	2	Potentially serious problem given what occurs with other species
Natural predation	1	1	0	2	
Predation by stray dogs	0	0	2	2	Scope: in the species' current range. Severity: in accordance with the current status
Diseases	1	3	0	4	In captivity, in accordance with the experience in Boukornine
Collisions on roads	0	0	3	3	
Disturbance	3	3?	3	9	In accordance with the current status
Overgrazing	2	2	1	5	
Forest fires	1	3?	3	7	In accordance with the current status
Fragmentation	1	1?	3	5	Lack of data
Climate change	?	?	?	?	Potential risk

3.3. CONSERVATION STRATEGY

In view of the threats described above and the fragmentation of the populations, it is clear that urgent conservation measures are required in order to conserve Cuvier's gazelle, and to allow it to breed and recolonise parts of its former range, especially in Tunisia. The important stages of the IUCN Species Conservation Strategy "SCS" process include the participatory establishment of a "Vision" and "Goals". Thus, the 2015 workshop aimed to draw up the Vision, the Goals, objectives and actions, following the IUCN SCS methodology (2008), in order to create the core of a Strategy or an Action Plan focusing on this species. Due to time constraints, it was not possible to describe in detail all the actions during the workshop, but this was completed later on. A global Vision for the species (2050) was drawn up by the participants in the stakeholders' workshop. A Goal (2027) was drawn up by each country in the range, in order to reflect the variable situation and status of the species in each territory:

3.3.1. Vision

By 2050, viable, connected populations of Cuvier's gazelle, a species endemic to three countries of the Maghreb, will occupy natural habitats in a range close to its historic distribution.

3.3.2. Goals

Morocco : *By 2027, the three main wild populations in Morocco, which are in the eastern part of the country, the western Anti-Atlas and the Lower Drâa-Aydar, should be maintained with rising numbers and an expanding range, and isolated populations in Tamri and Iguernan should be conserved.*

Algeria : *By 2027, all existing Cuvier's gazelle populations in this country will enjoy effective protection.*

Tunisia : *By 2027, all known wild or reintroduced populations of Cuvier's gazelle in this country will be protected and well managed.*

3.3.3. Intervention strategies

In order to achieve the Vision and the Goals, and depending on the threat analysis, intervention strategies and objectives need to be established, supported by short, medium and long-term activities. The seven intervention strategies identified are listed below and the activities proposed for each country are listed in Section 4:

1. **Protection and recovery of populations;**
2. **Protection and management of the habitat;**
3. **Awareness-raising and valorisation;**
4. **Research and monitoring;**
5. **International cooperation;**
6. **Capacity building;**
7. **Captive breeding and management.**

The importance of the intervention strategies differs from one country to another. For strategies 1 to 4, the objectives and actions were established by country; for strategies 5 to 7, they were drawn up at a regional level for North Africa.

4. Action plan for the conservation of Cuvier's gazelle in North Africa

OBJECTIVES AND ACTIONS: MOROCCO

Actions	Indicators	Responsibility	Priority*
Intervention strategy: Protection and recovery of populations			
Objective 1: To combat poaching			
1.1. Reinforce monitoring and guarding of the species' range (human and material resources)	Trained, equipped staff at each key site	HCEFLCD	H
1.2. Establish wildlife monitoring and guarding structures	Structures set up Monitoring programme created and implemented	HCEFLCD	H
1.3. Consolidate the coordination with all the stakeholders involved to fight against the poaching of the species	Coordination committee established in each region	HCEFLCD, stakeholders involved (civil society, Royal Hunting Federation, police...)	H
Objective 2: To fight against stray dogs			
2.1. Organise campaigns to shoot stray dogs (regularly)	Reduction in the number of stray dogs in key areas	HCEFLCD, local authorities	H
2.2. Stop the establishment of landfill sites inside and around key areas for Cuvier's gazelle	Decrease in number of landfill sites Reduction in the number of stray dogs in key areas	HCEFLCD, Environment, Local authorities	M
Objective 3: To recover the species			
3.1. Study the feasibility of reintroducing Cuvier's gazelle	Study carried out and validated	HCEFLCD	M
3.2. Transfer and release of individuals from the acclimatisation pens, following the recommendations of the feasibility study	Implementation of release or transfer operations	HCEFLCD	M
Intervention strategy: Protection and management of the habitat			
Objective 4: To protect and restore Cuvier's gazelle's habitat			
4.1. Integrate the key zones for Cuvier's gazelle into the protected area network	Protected areas created	HCEFLCD	M
4.2. Draw up and implement development and management plans for key zones for Cuvier's gazelle	Management plans validated and implemented	HCEFLCD, stakeholders involved	M

Actions	Indicators	Responsibility	Priority*
Intervention strategy: Awareness-raising and valorisation			
Objective 5: To reinforce the awareness-raising programmes			
5.1. Create suitable awareness-raising materials	Materials created		M
5.2. Organise awareness-raising meetings with hunters	Meetings organised Dialogue established	HCEFLCD Federation of Hunters	M
5.3. Organise awareness-raising meetings with local stakeholders	Meetings organised Local organisations take care of conservation	HCEFLCD Local organisations, NGO	M
5.4. Organise campaigns with regional and national media	Articles published or broadcast (press, TV, radio)		M
Intervention strategy: Research and monitoring			
Objective 6: To carry out research and monitoring activities			
6.1. Study Cuvier's gazelle's habitat use and movements in the Anti-Atlas	Study carried out and results published	Universités, chercheurs	M
6.2. Study Cuvier's gazelle's diet in the Anti-Atlas	Study carried out and results published	Universités, chercheurs	L
6.3. Implement a system for collecting data on Cuvier's gazelle	Database developed Monitoring system established	HCEFLCD	M
6.4. Implement the system for monitoring population size	Monitoring methodology adopted Managers trained		M
Intervention strategy: Captive breeding			
Objective 7: To establish groups of animals in captivity and semi-captivity			
7.1. Create well-managed pens for Cuvier's gazelle	Pens built for groups of animals in semi-captivity	HCEFLCD	H
7.2. Create an intensive breeding centre for Cuvier's gazelle	Groups of animals in captivity	HCEFLCD, ECWP	M

* Priority: H high M medium L low

OBJECTIVES AND ACTIONS: ALGERIA

Actions	Indicators	Responsibility	Priority*
Intervention strategy: Protection and recovery of populations			
Objective 1: To reduce direct mortality			
1.1. Build the capacity of the staff and stakeholders in charge of managing Cuvier's gazelle	Number of managers trained in all the key areas Reduction in mortality rates	DGF/MESRS/national and international experts/NGOs	H
1.2. Reinforce anti-poaching measures	Number of police reports issued Reduction in number of cases of mortality Mechanism implemented 100% operational Reduction in mortality rates	DGF/national police/ national safety/customs/ local authorities	H
1.3. Involve all stakeholders, including hunting associations and civil society in the fight against poaching	Number of meetings organised Dialogue established Reduction in mortality rates Awareness-raising programme implemented	DGF/hunting federations and associations/ local authorities	M
Objective 2: To reintroduce the gazelle into its natural habitat			
2.1. Train staff in captive breeding, diet, health monitoring, techniques for capture, release and for monitoring Cuvier's gazelles after release	Number of people trained Reduction in mortality rates	DGF/MESRS/national and international experts/NGOs	H
2.2. Reinforce hunting infrastructure	Quality and provision of hunting infrastructures	DGF	M
2.3. Identify the best reintroduction sites	Number of sites identified	DGF/researchers/ universities	M
Intervention strategy: Protection and management of the habitat			
Objective 3: To protect and manage the gazelles' habitat			
3.1. Integrate the potential zones for Cuvier's gazelle in the protected area network	New protected areas created Gaps in the protected area network analysed Potential reserves identified	DGF	M
3.2. Create ecological corridors	Corridors identified and mapped Planning measures drawn up	DGF	M
3.3. Rehabilitate degraded habitats of Cuvier's gazelle	Planning measures drawn up	DGF	H
3.4. Carry out rigorous impact assessments	Impact assessments carried out in accordance with international standards	DGF/MESRS/national and international experts/NGOs	M

Actions	Indicators	Responsibility	Priority*
Intervention strategy: Awareness-raising and valorisation			
Objective 4: To reinforce the awareness-raising programmes			
4.1. Implement extensive public awareness-raising, information and communication campaigns involving associations, the media and local populations	Articles published or broadcast (press, TV, radio) Meetings organised Decrease in removals and accidental deaths in the areas where these threats exist	DGF/NGOs/local authorities/media	M
4.2. Develop an environmental education programme	Meetings organised Local organisations taking care of conservation	DGF/NGOs/local authorities	M
4.3. Organise wildlife awareness-raising days	Meetings organised Awareness of populations and local authorities raised	DGF/NGOs/local authorities/media	M
Intervention strategy: Research and monitoring			
Objective 5: To carry out a research and monitoring programme			
5.1. Determine the current status of natural populations of Cuvier's gazelle	Existing populations determined	DGF/MESRS/national and international experts/NGOs	H
5.2. Identify and assess the Cuvier's gazelle gene pool	Publication of a report specifying the gene pool	DGF/MESRS/national and international experts/NGOs	H
5.3. Monitor and assess the viability and dynamics of Cuvier's gazelle populations on a continuing basis	Ecological monitoring reports carried out periodically Study carried out Results published	DGF/MESRS/national and international experts/NGOs	H

* Priority: H high M medium L low

OBJECTIVES AND ACTIONS: TUNISIA

Actions	Indicators	Responsibility	Priority*
Intervention strategy: Protection and recovery of populations			
Objective 1: To reduce direct mortality			
1.1 Reduce poaching to a minimum	Increase in Cuvier's gazelle population Decrease in signs of poaching Direct mortality reduced	DGF and CRDA NGOs	H
1.2. Apply the law rigorously	Police reports followed up Decrease in the number of police reports	National Guard, judges, national and local authorities, NGOs	H
Objective 2: To launch a reintroduction programme			
2.1. Develop a captive breeding programme	Programme developed and implemented Growth in the captive population	DGF, CSIC (Almeria), NGOs	H MoU signed April 2015
2.2. Identify the best reintroduction sites	Sites assessed	DGF, NGOs	M
	Gazelles transferred	DGF, CSIC, NGOs	Transfer from Almeria to National Park, October 2016
	Gazelles released in the National Park	DGF, CSIC, NGOs	M
2.3. Monitor reintroduction/reinforcement	Clear growth in the population (annual births/deaths)	DGF, CSIC	M
	Suitable sex ratio for a polygynous system	DGF, CSIC	M
	Infectious diseases detected	DGF, CSIC	M
Intervention strategy: Protection and management of the habitat			
Objective 3: To protect and restore Cuvier's gazelle's habitat			
3.1. Improve and reinforce guarding	Managers trained in all the key areas Direct mortality reduced	DGF and CRDA NGOs, national authorities	H
3.2. Assess the status of the population and the habitat in Chambi National Park	Mapping Monitoring of the situation	DGF, researchers	H
3.3. Agree on land use development and planning / impact studies	Improvement of habitats in key areas	DGF	H
3.4. Plan a monitoring system to fight against forest fires and deforestation	Increase in the forest surface area	DGF	H
3.5. Protect and restore the alfa grass steppe	Increase in the forest surface area	DGF	H

Actions	Indicators	Responsibility	Priority*
Objective 4: To ensure the connectivity of the habitat			
4.1. Carry out studies on potential corridors	Corridors identified and mapped	DGF, universities, NGOs	M
4.2. Increase the surface area of Djebel Serj National Park through the connection with Djebel Bargou	Corridor established	DGF	H
Intervention strategy: Awareness-raising and valorisation			
Objective 5: To reinforce the awareness-raising programmes			
5.1. Launch awareness-raising campaigns for schools, the media, local communities, journalists	Launch awareness-raising campaigns with the police the army, hunters and the administrative authorities Create brochures, postcards, organise conferences, information days, social media, films Public more attracted to nature Conviction of the importance of volunteering (charity work) Articles published or broadcast (press, TV, radio)	DGF, NGOs, journalists, universities, Ministry of the Environment, researchers	H
5.2. Launch awareness-raising campaigns with the police the army, hunters and the administrative authorities	Meetings organised Managers trained	DGF, NGOs	H
5.3. Create brochures, postcards, organise conferences, information days, social media, films	Materials created	NGOs	M
Intervention strategy: Research and monitoring			
Objective 6: To carry out research and monitoring activities			
6.1. Determine the current status of Cuvier's gazelle's remaining population	Study programme created Estimations of numbers	Universities, researchers, DGF	H (Djebel Chambi) M (reste du pays)
6.2. Assess the habitat response to the needs of reintroduced populations	Studies carried out Management plans adapted	Universities, NGOs Researchers, DGF	M
6.3. Monitor reintroduced populations' adaptation process (diet, diseases, behaviour)	Studies carried out Suitable management	DGF, NGOs, universities	H
6.4. Plan suitable training for managers, researchers, field officers, rangers and environmental wardens	Programme of courses and training sessions organised	IUCN, national and international specialists	H
6.5. Build human capacity (increase the number of staff in various areas)	Increased numbers in the key areas	DGF	M
6.6. Reinforce material resources (equipment, monitoring methods)	Suitable material in the key areas	DGF, NGOs	H
6.7. Set up a monitoring and assessment system	System in place Regular monitoring implemented	DGF, NGOs, universities	H

* Priority: H high M medium L low

REGIONAL OBJECTIVES

Actions	Indicators	Responsibility	Priority*
Intervention strategy: International cooperation			
Objectif 1 : Coordonner l'implémentation du plan d'action			
1.1. Draw up a mailing list including all the stakeholders	List drawn up and implemented	Government agencies, NGOs, IUCN-Med, CMS	M
1.2. Create a database on Cuvier's gazelle	Database created and available	Government agencies, CMS	M
1.3. Identify a point focal in each country in the range	3 focal points identified	Government agencies, NGOs	M
1.4. Assess at regular intervals (2-3 years) whether the indicators have been achieved	Report produced	CMS, NGOs, others?	M
1.5. Transmit the results of the actions undertaken to all the stakeholders	List drawn up and implemented (1.1)	All	M
1.6. Standardise the monitoring methods	Pilot actions, training	Government agencies	M
1.7. Ban the release of exotic ungulates into the natural environment.	No releases of non-native species take place	Government agencies	M
Intervention strategy: Capacity building			
Objective R2: To build capacity			
2.1. Organise training sessions on census and monitoring methodologies (distance sampling, camera traps, tracking, genetic identification)	Training sessions organised	Governments, NGOs, universities	H
2.2. Organise training in habitat management	Monitoring manager trained in each country within the species' range	IUCN-Med, government agencies	H
2.3. Build capacity in the management of captive populations (husbandry, handling animals, demographics and genetics)	Standardised monitoring programme implemented	EEZA/CSIC, government agencies	H

Actions	Indicators	Responsibility	Priority*
Intervention strategy: Captive breeding and management			
Objective R3: To develop an integrated strategy for an <i>ex situ</i> conservation strategy			
3.1. Update the guidelines on captive breeding	Guidelines drawn up and published	EEZA/CSIC	H
3.2. Translate these guidelines into French	Guidelines translated into French and communicated	IUCN-Med	H
3.3. Build capacity in the management of captive populations (husbandry, handling animals, demographics and genetics)	Programme of courses and training sessions organised A manager trained at each site where Cuvier's gazelle occurs	EEZA/CSIC, government agencies	H
3.4. Complete the genetic characterisation of Cuvier's gazelle	Study completed, results published	Research institutes CSIC	H (individuals captured recently in Algeria) M - L (others)
3.5. Ensure that reinforcement and reintroduction projects respect IUCN guidelines	Projects planned in accordance with IUCN guidelines on reintroduction and translocation	Government agencies, NGOs	M
3.6. Study the possibility of exchanging animals with Almeria through the EEZA-CSIC	Feasibility report produced	EEZA/CSIC, government agencies	M

* Priority: **H** high **M** medium **L** low

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Female Cuvier's gazelle.
Photo © A. Jebali

Appendix I:

Overview of the workshops

Within the framework of the “Improving capacity for species conservation in the Mediterranean region” project, notably funded by the MAVA Foundation, the Junta de Andalucía and the Fundación Biodiversidad, the IUCN Centre for Mediterranean Cooperation (IUCN-Med) organised two workshops to draw up a conservation strategy for Cuvier’s gazelle (*Gazella cuvieri*) in North Africa.

The first workshop was held in Almeria (Spain) on 14 and 15 November 2013 and served to set the process in motion. Over 15 experts from the field of science, representatives of the competent administrations and civil society, as well as the scientific and technical director of the CMS (Bonn Convention) participated actively (see Table 1) in the definition of a roadmap for developing a regional conservation strategy.

In the months that followed, a draft version of the state of knowledge of this species’ current status in North Africa was drawn up for consultation, review and validation by all the experts and stakeholders.

The second workshop was held with stakeholders in Agadir (Morocco) from 26-28 October 2015 in order to draw up a strategy to conserve Cuvier’s gazelle. This workshop focused on presentations, working groups and discussions. Twenty-eight participants were present (Table 1), including representatives from the IUCN Centre for Mediterranean Cooperation and the co-chair of the IUCN Species Survival Commission’s Antelope Specialist Group (ASG), who facilitated the workshop. The methodology followed that of the IUCN Species Conservation Planning Sub-Committee (2008). This workshop aimed to draw up a “Vision”, “Goals”, objectives and the actions to carry out in order to establish key parts of a Strategy and Action Plan for this species. Due to time constraints, it was not possible to describe in detail all the actions carried out during this workshop. The workshop was organised by the IUCN Centre for Mediterranean Cooperation and Morocco’s High Commission for Water, Forests and the Fight against Desertification (HCEFLCD), and funded by the MAVA Foundation.

Participants at the
2013 workshop.
Photo © PS/CSIC



Participants at the
2015 workshop.
Photo © IUCN-Med



Table 1. List of the participants in the workshops

Name	Organization	Country
Teresa Abáigar Ancín	Experimental Station of Arid Zones (EEZA-CSIC)	Spain
Abdelaziz Afker	Regional Directorate for Water and Forests and the Fight against desertification in the South West - Agadir	Morocco
Zahra Aïtoafello	Administrator at Wilaya Agadir	Morocco
Zouhair Amhaouch	High Commission for Water, Forests and the Fight against Desertification	Morocco
Violeta Barrios	IUCN Centre for Mediterranean Cooperation	Spain
Hatem Ben Belgacem	Ministry of the Environment	Tunisia
Roseline Beudels-Jamar	Royal Belgian Institute of Natural Sciences	Belgium
Farid Bounaceur	Ibn Khaldoun Tiaret University	Algeria
Mar Cano†	Experimental Station of Arid Zones (EEZA-CSIC)	Spain
Fabrice Cuzin	Wildlife and Protected Areas Consultant	Morocco
Koen De Smet	Member of the IUCN SSC	Belgium
Amina Fellous-Djardini	National Nature Conservation Agency (ANN) / Algerian Ecological Movement	Algeria
José María Gil-Sánchez	Harmusch - Wildlife Study and Conservation Association	Spain
Héla Guidara Salman	Directorate-General of Forests	Tunisia
Mohamed Hadjeloum	Directorate General of Forests	Algeria
Borja Heredia	CMS Secretariat	Germany
Abdelkader Jebali	Scientific expert / Tunisia Wildlife Conservation Society	Tunisia
Moulay Hfid Kbiri	Provincial Directorate for Water, Forests and the Fight against Desertification - Tinghir	Morocco
Adnane Labbaci	Regional Directorate for Water, Forests and the Fight against Desertification - Agadir	Morocco
Hassan Makhdach	Regional Directorate for Water, Forests and the Fight against Desertification– Agadir	Morocco
David Mallon	IUCN/ASC Antelope Specialist Group (ASG)	United Kingdom
Hayat Mesbah	High Commission for Water, Forests and the Fight against Desertification	Morocco
Eulalia Moreno	Experimental Station of Arid Zones (EEZA-CSIC)	Spain
Ruth Muñoz López	Ecuadorian Biodiversity Research and Monitoring Society (SIMBIOE)	Spain
Mohamed Noaman	High Commission for Water, Forests and the Fight against Desertification	Morocco
Catherine Numa	IUCN Centre for Mediterranean Cooperation	Spain
Widade Oubrou	Souss-Massa National Park	Morocco
Mohamed Ribi	High Commission for Water, Forests and the Fight against Desertification	Morocco
Mohammed Saidi	High Commission for Water, Forests and the Fight against Desertification	Morocco
Helen Senn	Royal Zoological Society of Scotland	United Kingdom
Teresa Luísa Silva	Centre for Research into Biodiversity and Genetic Resources (CIBIO)	Portugal
Jamel Tahri	Directorate-General of Forests	Tunisia
Antonio Troya	IUCN Centre for Mediterranean Cooperation	Spain



Djebel Amour, Algeria.
Photo © A. Fellous-Djardini



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