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Abstracts / Resumés



Oral communications / Présentations orales

Addressing conservation of threatened species through strengthening capacities: experiences from North Africa

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Key words: threatened species, conservation strategy; North Africa; capacity building; species action plan

The latest edition of the IUCN Red List shows that approximately 19% of Mediterranean species is endangered and 1% is already extinct at regional level. In this situation, the design and implementation of strategies for species conservation become essential. Species Conservation Strategies (SCS) are useful tools to assess the conservation status of species and their habitats at a given scale and to define conservation priorities. Moreover they are useful to assist decision-makers responsible for allocating resources.

A main difficulty in Maghreb countries is the lack of experience, training and capacities for the design and implementation of strategies for threatened species. IUCN seeks to address these shortcomings through the exchange of know-how and experience in preparation of SCS and implementation of appropriate conservation measures with a project involving key regional conservation actors.

In this context three workshops were held in Morocco, Algeria and Tunisia to train wildlife managers, relevant staff from national authorities, NGO members and university professors. Based on the trainings each country now works to develop a national strategy for the conservation of a threatened species and the three countries are joining forces to develop a regional strategy for the threatened North African endemic Cuvier's gazelle (*Gazella cuvieri*). Lessons learnt, preliminary results and next steps are presented.

État des lieux, conservation et possibilité de valorisation des ressources biologiques dans le Sud et l'Est algérien

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Mots-clefs : bilan, biodiversité, déclin, conservation.

La responsabilité de l'Algérie étant engagée pour la conservation des taxons de faune sauvage en voie de disparition. Cependant, elle se heurte à de grandes lacunes en matière des connaissances scientifiques. Nous passons en revue une synthèse sur les bilans et les travaux réalisés avec des résultats de terrain, tant fondamentaux (caractérisation biologique) qu'appliqués (outils d'aide à la décision).

Sustainable ecotourism in Sahelo-Saharan Desert: A panacea or an 'oasis' approach?

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Keywords: Ecotourism; Biological conservation; Cultural preservation; Impacts mitigation

There are many who concern about the potential of ecotourism to provide benefits for biodiversity conservation and rural communities' development. Through direct employment of locals or through their products' sale, the parks' fees and the voluntary economic contributions to conservation initiatives, the revenues generated by ecotourism in protected areas can be asserted into conservation and wildlife reintroduction programs. However, there are several examples of poorly managed projects, resulting in direct damages to habitats, species, and rural inhabitants. Nevertheless, there are also positive examples where all parts are benefited.

Almost all ecotourism research has been developed in pristine areas, especially in tropical less developed countries. Yet, few studies explored the potential of deserts for the development of ecotourism or even explored how it may benefit the desert biodiversity and its inhabitants.

Here it is intended to explore some issues related to the conservation of Sahelo-Saharan biological diversity and to the Tuareg' cultural preservation. I will address some hot topics like: 1) Can ecotourism constitute a means to safeguard the Sahelo-Saharan biodiversity and habitats?; 2) Should flagship species like addax (*Addax nasomaculatus*), dama gazelle (*Nanger dama*), desert cheetah (*Acinonyx jubatus hecki*), and North African Ostrich (*Struthio c. camelus*) be used to attract tourists that may provide revenues to conservation and reintroduction initiatives?; 3) How can the indigenous community be benefited from ecotourism?; 4) Can these benefits be enough for the abandonment of activities threatening desert biota and communities itself and, this way, preserve natural and cultural heritage?

Conserving real, wild animals in an approaching era of seductive alternatives

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Key words: De-extinction, practical conservation

Despite the huge size of the Sahel and Sahara, it has lost much of its innocence as wilderness; as over much of the world, we conserve biodiversity through 'gardening' – by protecting and supporting wild species in many ways.

This raises interesting issues about what constitutes a 'wild' population. Important though this is for conservation and the interests of SSIG and the Sahara Conservation Fund, this paper examines the prospects for conservation of species that might be the subjects of 'de-extinction' once they had been lost from the earth. Man's ability to recreate extinct species may be an opportunity and resource, but it may yet be a seductive mirage of optimism over practicality.

The two main de-extinction processes of cloning and genomic engineering are discussed briefly, with reference to the bucardo, *Capra pyrenaica pyrenaica*, and the passenger pigeon respectively. The obstacles and limitations inherent in each are discussed, with particular mention of the role of epigenetics, influencing interpretation of an individual's DNA during the developmental process. Finally, the potential of de-extinction for practical conservation in the Sahel and Sahara is examined across the three simple scenarios of (i) conserving remnant populations, (ii) reintroducing or (iii) waiting for suitable animals of a resurrected species and then (re-)introducing. These are tested against six survival factors for animals under each scenario. The overwhelming conclusion is to conserve what is living now, while acknowledging that de-extinction will become a reality.

Systematic Conservation Planning of the Sahara-Sahel: a framework for conserving biodiversity representation and persistence of the largest warm desert

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Keywords: biogroups; ecoregions; hotspots; priority conservation areas; reserve selection algorithms

This study combines spatially explicit climatic data with distribution data of terrestrial vertebrates of the Sahara-Sahel to identify regions with similar environmental features (ecoregions) and species assemblages sharing similar distribution patterns (biogroups), in order to assess their representation in the current protected area network. The study focuses on 1,147 species of amphibians, reptiles, birds, and mammals as these groups have the most comprehensive information available. Results show that: 1)

the Sahara-Sahel is environmentally heterogeneous and seven ecoregions can be defined; 2) the marginal areas of the Sahara-Sahel accumulate more species but the central Sahara accumulates the highest relative endemic richness; 3) 86% of analysed species are not threatened (by IUCN criteria), but 44% of reptiles have not been assessed and 7% of mammals are threatened (52% of ungulates); 4) 10 biogroups can be identified in the Sahara-Sahel (four for endemics) and wide-range biogroups tend to overlap specific ecoregions; 5) considering distinct conservation planning scenarios and targets, the distribution of current protected areas in the Sahara-Sahel is not optimized to cover biodiversity representation and persistence; 6) six areas of top-priority conservation in the Sahara-Sahel are identified; and 7) although more than 90% of priority areas are outside areas of large human activities, many priority areas cross multiple political borders and require international coordination efforts for implementation and management of protected areas. Conservation solutions at regional scale are needed to overcome expected impacts of climate change. More research in deserts is needed to help mitigating the likely depletion of important world biodiversity.

Preliminary review of results of camera trapping survey of the central Termit Massif.

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A six month camera trapping survey using 24 Reconyx cameras distributed across a 2km x 2km grid in the central Termit Massif was completed in June 2013, resulting in 19,743 images. The data have been entered into a camera trap data analysis tool currently under development at Zoological Society of London. This talk will illustrate the use of the analysis tool to provide an overview of sample effort, and analysis of data from an extensive camera grid. Examples of distribution maps through the grid, species lists, calculated event rates, displays of temporal patterns (activity) for selected species and other parameters such as naïve occupancy and modelled occupancy estimates will be illustrated.

Mountain rock pools in deserts are critical local hotspots of biodiversity

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Keywords: Local conservation, Sahara-Sahel, Mauritania

The world is undergoing exceptional biodiversity loss. Most conservation efforts target biodiversity hotspots. Their identification is mostly carried at large scales, often overlooking small-sized local hotspots. For instance, the Sahara-Sahel is thought to exhibit local high species richness restricted to mountain humid habitats but such diversity is mostly unknown. We quantified species richness and threats in 70 mountain rock pools (gueltas) of Mauritania. Gueltas hold about 35% and 85% of the vertebrates and endemic vertebrates of Mauritania, respectively, within a mere aggregate extent of 0.4271km². Water availability and area of gueltas were the predictors best related with species' numbers and gueltas are threatened by droughts, temperature extremes and human activities. About 63% of gueltas are currently unprotected. Gueltas are crucial for local biodiversity conservation and human economy, and require urgent management plans. Given their disproportional importance in relation to their size, they constitute local hotspots of biodiversity deserving global attention.

La désertification au delta intérieur du Niger

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Aspects particuliers de la 'désertification' observés au delta intérieur du Niger sont discutés : plusieurs sortes de vie comme riziculture, pêche, pastoralisme, commerce fluviale ont été détruites.

La 'désertification' du delta prend des aspects tout différents de la désertification en image général, car celle-ci ayant été façonnée sur le modèle de la terre aride ou semi-aride. Le delta étant un environnement aquatique, sa désertification est sans désertification. Mais elle est la plus sérieuse, car la population importante concentrée au delta pratiquant plusieurs genres de vie devient en est victime, lorsque ceux-ci se détruisent.

La victime typique est la ville de Djenné située sur une île dans le delta. J'ai travaillé depuis 1985 à Djenné. Sa prospérité a été considérée comme à la grâce des transports fluviales liés avec Tombouctou, ville trans-Saharienne et également islamique. La mine de sel exploitée au milieu de Sahara transporté sur le dos de Dromadaire jusqu'à Tombouctou a été envoyée ensuite jusqu'à Djenné par bateau. La mine a été transportée au delà de Djenné jusqu'à la mine d'or pour gagner de l'or.

L'économie de Djenné ne s'y est pas pourtant limitée ; elle s'est également appuyée sur la première production très riche et variée, réalisé avec les eaux des fleuves Niger et Bani : riziculture, pêche, pastoralisme.

La cause principale pour la 'désertification' du delta est l'abaissement du niveau des eaux des fleuves ayant été sinon suffisamment hauts pour faire couler les eaux hors des fleuves et arroser le delta entier.

And after crossing Sahara, what? Answers from a tiny oasis in Sahara (Morocco)

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To improve our knowledge of the different migratory strategies undertaken by European trans-Saharan migrants to cross the Sahara desert in autumn and the potential role therein of desert oases, from 19 August to 30 October 2011 we collected field data on body condition and stopover behaviour at Yasmina, a tiny oasis in southeast Morocco.

In general, the saharan species require further refueling en route if they are to reach their winter quarters safely. The remaining species (Willow Warbler *Phylloscopus trochilus*, Spotted Flycatcher *Muscicapa striata* and Pied Flycatcher *Ficedula hypoleuca*) arrived with intermediate fuel loads, which were in most cases insufficient for reaching the Sahel without further refuelling.

Despite being mostly linked to marshy habitats, at least part of the population of the Reed Warbler *Acrocephalus scirpaceus* seemed to follow a similar strategy.

Among the species linked to more mesophile habitats strategies were more varied. At least three (Common Redstart *Phoenicurus phoenicurus*, Garden Warbler *Sylvia borin* and Blackcap *Sylvia atricapilla*) generally arrived in the oasis with enough fuel reserve to reach the Sahel without further refuelling and then left the site rapidly.

This study showed marked differences in arrival fuel loads and in the need to rely on desert oases as stopover sites, a finding that largely corroborates the diversity of strategies previously described among species crossing the Sahara, but which also highlights the existence of a large degree of individual variation, and the habitat preferences alone, may have a more important role in shaping trans-Saharan migratory strategies in passerines.

Contribution de l'ANN dans la sauvegarde des espèces de faune menacée en Algérie.

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L'Agence Nationale pour la Conservation de la Nature (ANN) depuis sa création en 1991 en tant qu'institution gouvernementale tente d'améliorer les connaissances sur la faune sauvage en général et sur la celle menacée en particulier, avec la contribution de nombreux partenaires aussi du monde scientifiques qu'associatif.

On présentera succinctement les travaux engagés et des projets à venir afin de faire connaître la nouvelle démarche enclenchée concernant la sauvegarde de la faune saharienne, dont la station d'élevage des gazelles dorcas et leptocères dans la wilaya d'El Bayadh ainsi qu'un centre de reproduction des autruches à cou rouge dans la wilaya de Laghouat.

Resilience and Natural Resource Stewardship in the Sahel

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TREE AID

Keywords : drylands ; Sahelian ; resilient livelihoods ; climate change

TREE AID is an international NGO that works to unlock the potential of trees to reduce poverty and protect the environment in the drylands of **Africa**, specifically the Sahelian and dry Savannah zones. Since its establishment in 1987, TREE AID's founders believed that community forestry could ensure that people in rural Africa's drylands were less vulnerable to drought and famine and, with sustained change over time, that the cycle of poverty and environmental decline could be broken. It operates through its themes of tree enterprise, forest governance, natural resource management, and food security.

This presentation will discuss the roles of drought-adapted trees in their natural environment which offer pathways to resilient livelihoods and landscapes in the face of climate change. It will outline how TREE AID: tailors knowledge-sharing for communities; boosts rural livelihood opportunities; and protects and restores water courses and degraded landscapes to which wildlife species can return. It will outline TREE AID's role in developing local stewardship in alignment with government efforts across the Sahel to devolve administration and decision-making to local governing bodies.

Last year TREE AID worked with **350 communities** and almost **70,000 people** in Burkina Faso, Ethiopia, Ghana, Mali and Niger, and provided consultancy services in Kenya and Benin. Since TREE AID's establishment millions of people reap tree-derived benefits and improvements in their soil and water. More importantly TREE AID has worked to ensure that millions of trees may regenerate due to changes in natural resource management leading to restoration of degraded landscapes.

Enjeux et Problématique de Gestion d'une Aire Protégées en Zone Sahélienne au Niger : Cas de la Réhabilitation de la Réserve Totale de Faune de Gadabédji (RTFG)

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Le Niger est un pays Sahélien de grande tradition de conservation de la faune. Il dispose de sept (7) Aires Protégées (AP) qui constituent les derniers refuges de la grande faune mammalienne. Parmi ces AP figure, la Réserve Totale de Faune de Gadabédji (RTFG), située dans une zone de transition climatique entre le Sahel et le Sahara. Elle représente, en partie, l'écosystème caractéristique de la région biogéographique Sahélo- Saharienne, domaine de la grande faune sahélo-saharienne comme, l'Oryx (*Oryx dammah*), la Gazelle dama (*Nanger dama*), la girafe (*Giraffa camelopardalis peralta*), l'autruche à cou rouge (*Struthio camelus camelus*). Cependant, toutes ces espèces emblématiques ont disparu de nos jours sous l'effet des aléas climatiques mais surtout sous l'action néfaste de l'homme à travers le braconnage, le pâturage illégal. L'état nigérien a décidé depuis quelques années de réhabiliter cette AP qui ne dispose plus que de 13 espèces de mammifères en 2010 contre 23 espèces en 1955 lors de sa création.

Pour ce faire, après un accord de gestion pastorale signé entre les éleveurs et les gestionnaires de la réserve en 1991, un état des lieux de la réserve a été effectué en 2010, suivi de la mise en place d'une Unité de Gestion en 2012 à Gadabédji. Un certain nombre d'études complémentaires ont été élaborées pour cette réserve dont le Plan d'Aménagement, de Gestion et de Conservation (PAGC) et le projet de repeuplement et de réintroduction des espèces fauniques de valeur disparues dans la RTFG.

Historical range reductions dramatically influence climate change predictions. The cases of *Loxodonta africana* and *Giraffa camelopardalis* in Africa

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Keywords: Africa; environmental niche; giraffes; savannah elephants; Species Distribution Models

Anthropogenic climate change is one of the most striking factors threatening global biodiversity. Synergistic effects with other human induced factors such as habitat loss are expected to aggravate the situation. Predictive assessments integrating both factors are needed for a coherent establishment of conservation strategies. Species distribution models (SDM) are commonly used for predictive assessments and much research has been devoted to improve and standardize analyses, and reduce uncertainties. However, the influence of human induced range reductions and the associated loss of the full environmental niche of species in SDM predictions of climate change remain unexplored. Here, we use two different distributional datasets, Global (data for the beginning of 1900) and Partial (data for current times), for two African mammal species which have experienced notably range reductions due to habitat loss and poaching: savannah elephants (*Loxodonta africana*) and giraffes (*Giraffa camelopardalis*). We compare the environmental variability associated to each dataset and perform consensus SDM (4 modelling techniques) and project them to future scenarios of climate change (for 2080) in order to test for differences. We show how historical range reductions can differentially reduce the environmental variability associated to the niche of species. These differences have important repercussions in predictions of suitable environmental space and trends of vulnerability for the species under climate change scenarios. Climate change assessments should take in account the historical distributional range of species for incorporating their full environmental niche, particularly in species with accused range reductions due to human activities, such as many large mammal species in Africa.

Inventaire de l'entomofaune dans trois types de palmeraies (région d'In Salah)

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Mots clé : Inventaire, In Salah, pots Barber, filet fauchoire, quadrats des Orthoptères, capture direct.

Inventaire de l'entomofaune dans la région d'In Salah qu'est appartenant à l'étage bioclimatique saharien à hivers doux s'est déroulé dans trois types de palmeraies. En employant quatre méthodes d'échantillonnage: pots Barber, filet fauchoire, quadrats des Orthoptères et captures direct. Ces méthodes ont permis d'échantillonner 4786 individus répartis en 2 embranchements, celui des Annelida et celui des Arthropoda, ce dernier regroupe 4 classes, Crustacea, Chilopoda, Arachnida et Insecta qui est la classe la plus dominante par 11 ordres représentés par Podurata, Hymenoptera, Coleoptera, Homoptera, Heteroptera, Lepidoptera, Orthoptera, Blattoptera, Mantoptera, Diptera, Dermaptera, Neuroptera, Thysanoptera et Odonata. L'ordre des Hymenoptera est le plus dominant en nombre d'individus (1626) et 41 espèces regroupées en 11 familles dont celle des formicidae qui reste la plus importante.

Elephant conservation during and after war: the case study of Mali

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Keywords: Human-elephant conflict mitigation, biodiversity conservation, resilience enhancement, sustainable natural resource management, collaborative approach, livelihoods.

This presentation will describe how the Mali Elephant Project has responded to the seizure of the north by armed groups. Following the coup all government presence vanished from the area - it became lawless, guns proliferated and for the first time elephants were killed. Quick thinking was required to protect the elephants while maintaining the momentum of the project.

We held a four-day community meeting to discuss the main challenges and preoccupations, as well as the threat of elephant poaching, and the strategy developed from there. Some key points were that clan leaders and elders committed to do all they could to prevent poaching by the armed groups, while the young men were recruited to form vigilance networks that gathered information on the elephant killings. They also helped in resource protection activities such as fire-break construction and bush patrols. Although paid only in food, none of these 520 young volunteers joined the jihadi groups, and markedly fewer joined up in areas of the elephant range where the project is active. However, they needed armed back-up, and so we worked with the government to deploy an anti-poaching unit, composed of elite foresters, that would work closely with the community once the area had been secured. Only six elephants have been killed but the threats continue, not only from armed groups seeking revenue, and elephant-eating tribes just over the border, but also by the return of refugees and post-conflict reconstruction for communities severely riven by the conflict and its aftermath.

Termit & Tin Toumma National Nature Reserve, Niger: outcomes & challenges

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Keywords : protected area, management, poaching, awareness & capacity building.

After one year of activities, major achievements and progresses have been made by the PCBR project in the sound management of the Termit & Tin Toumma National Nature Reserve in Niger. The management team of the reserve has been trained to monitor the exceptional and unique wildlife and its habitat. In addition, successful awareness campaigns have been carried out and with the support of local communities including community game guards and traditional leaders. Poachers, including soldiers from the Nigerien army, are now prosecuted and punished for breaking national law concerning threatened species.

There are still many challenges to face for the project staff side a side with the Ministry in charge of the Environment. Those challenges are: create consultation frame works with all the partners including the oil extractor companies, implement a management committee representing all the stakeholders and raise funds to carry out the activities of the management plan for the next 4 years.

Variation saisonnière du régime alimentaire du Fennec, *Fennecus zerda*, dans le Sahara septentrional en Algérie (cas de la région de Ghardaïa)

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Mots clés: Fennec, variation saisonnière de régime alimentaire, crottes, biomasse, carnivore opportuniste, Ghardaïa (Ben Ahmed).

L'étude de la variation saisonnière de régime alimentaire du Fennec a été réalisée dans la station Ben Ahmed de la région du Ghardaïa (32° à 28° N. ; 3° à 42° E) qui fait partie de l'étage bioclimatique Saharien à hiver doux. Elle est basée essentiellement sur la connaissance du régime alimentaire en fonction des saisons de ce canidé. Par ailleurs, elle nous a permis d'avoir un aperçu sur la faune de la région en général, à travers l'échantillonnage effectué dans la station de Ben Ahmed. L'analyse des crottes du Fennec, a donné 75 espèces appartenant à 6 classes animales et un phylum végétal. 17 ordres et 31 familles ont été déterminés, sur les 770 items ingérés par le Fennec. L'étude de régime

trophique a montré que la classe Insecta détient le maximum d'effectifs avec 597 individus, suivie par Mammalia avec 142 individus puis les Arachnida avec 14 individus. En termes de biomasses, c'est Mammalia qui domine avec 87%, suivie par Insecta 9%, Aves avec 2,3% et Reptilia 1,6%. Les vertébrés étant plus importants en termes de biomasse que les invertébrés. À l'instar de cette étude, le Fennec peut être considéré comme étant un carnivore opportuniste par excellence.

First assessment of distribution and phylogeny of hedgehogs in North Africa

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Keywords: *Atelerix*, hedgehogs, North Africa, *Paraechinus*, phylogeography

Despite the growing interest in slowing down the current rate of biodiversity loss many geographical areas remain neglected by researchers. The hedgehogs (Mammalia; Eulipotyphla) distributed in deserts are mostly understudied. In North Africa, there are four known species, belonging to genera *Atelerix*, *Hemiechinus* and *Paraechinus*, with unclear distributions and phylogenetic relationships. The main objective of this study was to investigate, for the first time, the evolutionary and phylogeographic patterns of the North African species, using two molecular markers. It was analysed 136 new mitochondrial sequences and 78 new nuclear sequences from African and Eurasian species. Some species were sequenced for the first time with both molecular markers. Phylogenetic trees, distribution maps, networks and diversity indexes were estimated based on mtDNA and nDNA sequences. Results suggest broader distribution than previously known of *Atelerix algirus* in the northern areas of Africa. Evidences of the presence of *Paraechinus aethiopicus* in Africa were not found inside their known range. Genetic incongruities found between mtDNA and nDNA suggest a possible introgression between *A. algirus* and a new previously unidentified population. High genetic differentiation was found between *A. albiventris* populations located on opposite sides of a putative geographic barrier (Niger River). Although new clues to understand the phylogeography of hedgehogs were discovered, results suggest that more samples and robust analyses are needed to enhance the present understanding of North African hedgehogs.

La faune sauvage en Algérie : Béchar

Radouane Tahri

Une grande biodiversité existe dans le Sud Ouest algérien déjà remarquable par sa géomorphologie, cette région en particulier renferme encore de multiples habitats favorables au développement d'une faune sauvage encore très diversifiée, de l'Atlas Saharien avec ses hauts sommets, en passant par les zones humides locales puis vers les zones pré désertiques steppiques et sahariennes. Aussi, nous comptons faire partager une présentation inédite de la faune en général et des espèces menacées en particulier celles encore existantes dans la région de Béchar, des troupeaux de mouflons à manchettes, les gazelles dorcas et Cuvier, les grands rapaces, les oiseaux d'eau fréquentant le barrage de Djorf el Torba comme les spatules blanches, les flamants roses, sans omettre la curiosité locale de la loutre, espèce plutôt paléarctique qui se retrouve à quelques kilomètres des dunes du grand Erg Occidental.

ecoRelevé, Opens Source platform for data management

Amandine Sahi¹, Thomas Peel¹, Jean-François Leger^{1 & 2}, Olivier Rovellotti¹, Yves Hingrat²

1 : Natural Solutions

2 : Reneco

The rapid growth in the volume of collected biodiversity data, their heterogeneity and their complex nature can be the bottleneck to taking rapid action to safeguard what is left of our environment. The ecoRelevé platform is a free and open source software designed to tackle the current data growth issues; it allows

the modelling of heterogeneous field observations and provides tools for data browsing and data annotation. It is fully customizable based on the ideas of a protocol designer, thus ecoRelevé is suited for all usage scenarios. We believe we can produce a very affordable solution for many potential users in the Sahara bioregion.

Splitting or lumping? Genetic analysis and the conservation of the dama gazelle (*Nanger dama*)

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Dama gazelle conservation may ultimately face the dilemma of whether to keep the various wild and captive populations separate to conserve local divergence and minimize the risk of outbreeding, or whether to manage populations jointly to reduce loss of genetic diversity and minimise inbreeding. We examine genetic relatedness and diversity in three of the five last remaining wild populations of dama gazelle and a number of captive populations, using mtDNA control region and cytochrome b data. Despite the sampled populations belonging to the three putative subspecies, which are delineated according to phenotypes and geographical location, we find limited evidence for phylogeographical structure within the data and no genetic support for the putative subspecies. In the light of these results we discuss what the genetic issues surrounding the conservation of dama gazelle are, what this new data might mean for their conservation, the pitfalls and advantages of using genetic data to delineate (sub)species and suggest possible ways forward.

Conservation review of the dama gazelle (*Nanger dama*)

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Key words: Reintroduction, *mhorra*, *ruficollis*, *addra*

The dama gazelle (*Nanger dama*) is one of the three most threatened antelope species. Once distributed widely across the Sahelo-Saharan region, it is known to survive in only five small subpopulations in Mali, Chad and Niger and numbers in the wild are estimated to be <300. Approximately 1500 animals exist in captivity worldwide (in zoos and on Texas ranches) which have been bred from around 24 founder individuals collected from the wild in the second half of the twentieth century. Since the 1980s dama gazelles have been released from captivity into fenced reserves in Morocco, Senegal and Tunisia with mixed success.

A workshop was held at RZSS, Edinburgh, in November 2013 to review and consider key issues for dama gazelle conservation, working toward a vision of “Sustainable and free-living populations of dama gazelle persisting in their indigenous range, supported by well-managed populations elsewhere”.

Following the workshop, new information and discussions were combined with existing literature to compile an updated review document, including recommendations for future action.

This paper will summarise the workshop and introduce the review document and its conclusions to the SSIG community. It is intended to provide the basis for a full dama gazelle conservation strategy to be developed by the dama gazelle stakeholder community: principally range state agencies, international and local conservation NGOs and research institutions.

Update on status of dorcas, dama and other wildlife observed during survey work in Chad, March 2013 to February 2014

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Since the beginning of 2013 the SCF/ZSL survey team have undertaken two surveys to the Ouadi-Rimé-Ouadi Achim Game Reserve to conduct dry season and wet season monitoring of wildlife and livestock, and undertake assessment of potential oryx release sites. In Jan-Feb-2014 a survey of the Chadian Manga was undertaken to carry out the first dry season assessment of land use and wildlife in the region, with particular focus on the status of dama gazelle.

This presentation will summarise the results of all three surveys and briefly review the current structure of proposals for the monitoring scimitar-horned oryx reintroduction in Chad.

Phylogeny of North African gazelles: a mitochondrial and nuclear approach

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Keywords: Conservation genetics, ecotype, North Africa, phylogeny

Evolutionary relationships of the genus *Gazella* have been extensively studied. However, phylogenetic studies based solely on mitochondrial data express difficulties in separating clearly some gazelle species. For instance, some species classified as distinct that display different life histories and habitat selection patterns, are phylogenetic very close. This is the case of *Gazella cuvieri* and *Gazella leptoceros*: they exhibit different distribution areas and ecological characteristics, but are not distinguishable with mitochondrial markers. In this work, a mitochondrial fragment of the cytb gene and sequences of five nuclear genes from a total of five species (*Gazella dorcas*, *G. cuvieri*, *G. leptoceros*, *Eudorcas rufifrons* and *Nanger dama*) were used to investigate the phylogeny of genus in their North-African range. Analyses using maximum parsimony, maximum likelihood, and Bayesian approaches provided a unique and well-supported scenario of phylogenetic relationships. Results show that none of the markers clearly separates *G. cuvieri* and *G. leptoceros*, and they always represent a monophyletic lineage within the clade. These findings led to hypothesise that these species are ecotypes, ecologically distinct entities they have been evolutionarily adapted to living in different habitats with unique local adaptations. Nevertheless, samples from Sudan (terra typica of *G. leptoceros*) are needed to fully understand the phylogenetic relationships between these two species and to resolve the systematics of the group. In the future, these hypotheses should be taken into account when designing conservation options for the two endangered species.

Preliminary data on the status and biology of the Cuvier's gazelle in the Sahara range of Morocco

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Key words: Aidar Massif, Cuvier's gazelle, Draa Valley, Morocco, survey

As a part of a long-term study in collaboration with the HCEFLCD and l'Institut Scientifique de Rabat, a preliminary survey of the Cuvier's gazelle was carried out between 2011 and 2013 in the area of Lower Draa Valley, Yebel Ouarkiz and Aidar Massiff (Morocco). It is a ca. 20.000 Km² region at the North of the

Western Sahara desert, where this species reaches its southern most limit. The survey was taken by seven expeditions of one week each, with 53 walking surveys (1026 Km) and 20 camera-trapping points. The Cuvier's gazelle (*Gazella cuvieri*) was detected in 75,4% of the surveys, with 51 observed individuals and 4 captured by camera-traps. Estimates by *Distance* program offered a density of $0,088 \pm 0,022$ ind./Km² and a total population of 1063 (95% IC = 629-1795), with the inferred distribution range base on both surveys and preliminary mapping of optimal habitat. The species showed a clear habitat selection: hilly and rocky terrain with lines of thorn trees along the valley bottoms; gazelles were rarely detected in flat open terrain more than 1 Km away. A marked browser feeding behavior was observed, with the main plants consumed being *Acacia tortilis* and *A. ehrenbergiana*. It seems to be a healthy population from a demographic point of view (males/females = 0,59; % sub-adults = 31,1%); with estimated births taking place as early as beginning of March and twins were observed. Poaching was confirmed to be widespread (detected at 22,5% of surveys), therefore urgent conservation actions and long term monitoring should be implemented. Additionally, since this is likely the most important population of this endangered species, the legal status should be changed from "secondary focus" to "primary focus" within the Action Plan for wild ungulates of Morocco.

Etat des populations naturelles de *Gazella cuvieri* (Ogilby, 1841) dans la région de M'Sila en Algérie

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Mots clés : *Gazella cuvieri*; populations naturelles; effectifs; répartition; Cartographie; M'Sila

La présente étude porte sur la répartition spatiale des populations de *Gazella Cuvieri*, dans la région d'El Hodna wilaya de M'sila en Algérie.

L'étude traite les résultats relatifs à des questionnaires ont posé sur quelques personnes et quelques observations directes ont été fait au niveau des biotopes naturels de la région sud de la wilaya de M'sila en Algérie. L'étude établit la distribution de *Gazella cuvieri* dans la région sud de la wilaya de m'sila dans le but de réaliser la cartographie de l'aire distribution de l'espèce.

Evaluation des populations des effectifs de gazelles observées a été abordée au cours de 2013 et 2014 dans toutes les communes de la wilaya de M'sila en Algérie.

Des mesures de conservation ont été proposés en vue de renforcer la préservation et la conservation de cette espèce endémique du Maghreb.

La réintroduction des Antilopes sahélo-sahariennes au Sénégal : historique et situation actuelle

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Mots Clés : Réintroduction, RSFG, RFFN, Oryx algazelle, Gazelle dama, Gazelle dorcas, Sénégal

Dans le Cadre de la politique de restauration et de réhabilitation de la faune sahélo saharienne, l'Etat du Sénégal a depuis le début des années 80, initié une politique de réintroduction des antilopes sahélo-sahariennes (ASS) disparues. C'est ainsi qu'en 1983, a été créée la Réserve Spéciale de Faune de Gueumbeul (RSFG) situé à environ dix (10) km de Saint-Louis et d'une superficie de 720 ha entièrement clôturée. Un des objectifs majeurs de la création de cette Réserve, était de servir de centre d'élevage pour la réintroduction des ASS. Dans le prolongement de cette politique, la gestion de la Réserve de Faune du Ferlo Nord (RFFN) qui abritait une population résiduelle de gazelles à front roux (*Gazella rufifrons*), Autriche cou rouge (*Struthio camelus*), Tortue sulcata (*Geochelone sulcata*, etc., s'étendant sur une superficie de 487 000 ha, fût transférée en 1996, sous tutelle de la Direction des Parcs Nationaux (DPN). Ainsi, en 2002, un enclos de 500 ha a été érigé dans la Réserve à Katané pour préparer et accueillir les premiers transferts d'animaux vers le Ferlo à partir de la RSFG. L'enclos a vu sa superficie portée en 2009 à 700 ha puis à 1250 ha en 2012. Ce transfert a permis à la DPN de compléter son réseau d'aires protégées représentatives des différents écosystèmes du pays.

Le Sénégal abritait jusqu'au XXème siècle la gazelle dama (*Gazella dama mhor*) et l'oryx algazelle (*Oryx dammah*). Leur disparition se situe dans les années 70 pour la dama et 1900 pour l'oryx (Sclater, 1898a, Poulet, 1972, 1973, Jebali, 2003, 2008, 2012). Les opérations de réintroduction des antilopes sahélo sahariennes ont commencé en 1984 dans la RSFG (07 Gazelles dammah en 1984, 8 Oryx en 1999 et 20 Gazelles dorcas en 2007). En 2013, le cheptel est composé d'environ 80 Oryx, 27 Gazelles dorcas et près de 13 Dama mhor. Au niveau de la RFFN, la réintroduction a débuté en 2003. A partir de 06 Gazelles dama réintroduits en 2003, la population actuelle est estimée 20 individus. Pour la population d'Oryx, de 08 individus en 2003, le cheptel est estimé en mars 2014 à environ 200 individus. Concernant les Gazelles dorcas, 23 individus ont été réintroduits en 2009. La population actuelle est estimée à environ 30 et a été victime d'une forte prédation par les chacals. L'augmentation de la population d'Oryx au niveau de l'enclos de Katané a atteint des niveaux record en 10 ans (08 contre 200). Ainsi, la DPN est entrain de réfléchir sur le transfert dans un autre site et de préparer une stratégie de lâcher dans la nature qui constitue l'objectif final de sa politique de réintroduction.

Assessing the Genetic Diversity of the National Meta-population of Scimitar-horned Oryx in Tunisia

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Key words: Scimitar-horned oryx, reintroduction, genetic diversity, meta-population

Historically, scimitar-horned oryx occurred across Tunisia's southern steppes, but disappeared by 1910. However, during the last three decades, the species has been returned to four protected areas, beginning with the initial release of 10 oryx into Bou Hedma National Park in 1985. Since then the oryx at all sites have been closely monitored, but there has been little management of the meta-population. We undertook extensive tissue sampling of the national scimitar-horned oryx herd to inform a national meta-population management plan. This meant devising practical, cost effective methods of acquiring samples from free-ranging antelope that may be applicable in similar situations elsewhere. In total, we successfully collected, and DNA was extracted, from the samples of 95 oryx. Preliminary results indicate that each of the four oryx populations appears to have at least one unique lineage. As expected, the most recently established herd in Dghoumes National Park has the greatest genetic diversity, validating the animal selection strategy for this project. However, there is still genetic diversity in the European and other source populations not represented in Tunisia.

Source Population Alliance--A sustainable population of wildlife that serves as a dependable reservoir for *ex situ* and *in situ* conservation and utilization

Adam Eyres

Fossil Rim, USA

The Conservation Centers for Species Survival (C2S2) have been working on a new program, the Source Population Alliance (SPA) for about a year, and it is about to become official as early as June, 2014. The basis of the program is that *ex situ* populations of ungulates are not sustainable as they've been traditionally managed in zoos and there are a large number of ungulates in private hands—especially in Texas. This alliance will be made up of public and private partners with the main objective of being able to create truly sustainable meta-populations of ungulates as a single resource shared by multiple partners.

This is a new paradigm because although many years ago there was more animal movement between the public and private sector, in the US, it wasn't a coordinated management plan. Several United States public institutions have continued to work with privates over the years, and the SPA will create a more acceptable structure for working with a variety of partners in the future, as well as provide opportunities to expand private interests and build capacity within the public and private facilities.

The forgotten gazelle: status and conservation perspectives of the Red-fronted gazelle (*Eudorcas rufifrons*) in North-western Senegal

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Keywords: Antelopes, Conservation, Djoudj NP, Historic records, Population trend

The Red-fronted gazelle (*Eudorcas rufifrons*) has been facing a decline in range and numbers due to poaching and habitat degradation, being currently reduced to a few scattered populations across Sahel. It is classified as Vulnerable, although IUCN recognizes that with the present declining trend it will probably become Endangered or Critically Endangered. Nevertheless, this species is often overlooked on status and conservation assessments of the Sahelo-Saharan Antelopes, and as a consequence recent and accurate surveys are lacking, especially in the western region of its range. Here we conduct a review of the Red-fronted gazelle population status in Parc National des Oiseaux du Djoudj (NW Senegal) where the species has been frequently misidentified as Dorcas gazelle (*Gazella dorcas*) and, consequently, disregarded as a conservation priority. Based on a compilation of available literature, questionnaires to local people and recent fields surveys (2010, 2011, 2012 and 2014) using observation points, transects and non-invasive sampling, we address: i) the historic presence and decline of Antelope species based on local knowledge; ii) the population trend of Red-fronted gazelle and Dorcas gazelle since 1972, when both species were (re)introduced in the area; iv) the current population size and the area occupied by gazelles in the study area, with all morphological and genetic evidences suggesting the absence of Dorcas gazelle and the occurrence of a relict population of Red-fronted gazelle with less than 10 individuals. Based on these results we propose several in-situ and ex-situ conservation actions for this endangered Sahelian Antelope.

The Houbara Bustard, a flagship for few of us but certainly an umbrella for all of us

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The Houbara Bustard is an endangered bird species inhabiting arid lands and an emblematic game species for the traditional Arab falconry, a practice recognised as a living human heritage by UNESCO. Surprisingly, the Houbara remains poorly known from the large audience, while it is undeniably a flagship species (i.e., *a species that have the ability to capture the imagination of the public and induce people to support conservation action and/or to donate funds* - Walpole and Leader-Williams 2002), for at least a restricted public, falconers and few conservationists of arid environments. As a consequence, the Houbara has benefited from pioneering conservation and research initiatives launched in the past decades successfully promoting the study of biodiversity and conservation of arid environments. In North Africa, 15 years of survey of the Houbara, conducted by the Emirates Center for Wildlife Propagation, underlined the extensive range of the species and its complex ecology. Studies on houbara requirements (habitat use, diet) provided unique opportunity to investigate flora and invertebrate fauna in poorly explored regions. Hunting management of reinforced houbara populations led to the creation of sanctuaries where protection measures benefited to other endangered species (e.g., Dorcas and Cuvier Gazelles), making this bird a true umbrella species.

Strong decline of the bearded vulture in Morocco and its importance for the conservation of Mediterranean populations

Godino, A., Paz, J.L. & Jódar, P.A.

Keywords: bearded vulture, Morocco, extinction.

The bearded vulture *Gypaetus barbatus* suffered a strong decline throughout its Mediterranean basin range during the 19th and 20th centuries. Since the end of 20th century extensive conservation efforts to save this specie have been carried out in Europe, i.e. *in-situ* conservation of remaining wild populations,

captive breeding, reintroduction programs, etc. In the beginning of 20th century this specie was widespread in North Africa, as in Europe, but nowadays its conservation status is critical. In Morocco, a strong decline was detected during the 1980's and 1990's, when the total population was estimated as 100 pairs, and the last breeding success was recorded in 1983. In this study we report the results from several surveys performed from 2002 to 2014, which confirmed the extinction of *G. barbatus* in the Middle and Anti Atlas mountains and detected only a small population (10-15 territories) surviving in High Atlas, where breeding success was again confirmed but population decline at local level still continues. The North African population of *G. barbatus* has an important ecological role, both regionally as well as locally, and urgent conservation actions are needed. Preserving and increasing the North African population are vital steps towards restoring the specie throughout the Mediterranean, promoting the future contact between the Moroccan and European subpopulations. This would represent a strong mutual benefit due to the current low genetic variability in this latter population, even after 30 years of conservation efforts.

Egyptian Vulture on the Balkans: threats and implications for conservation along the flyway and in the wintering grounds in Sahel zone

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The endangered Egyptian Vulture (*Neophron percnopterus*) is a Palearctic species with consistent and steep declines throughout its range. In Europe, the species is a long-distance migrant spending the winter in Africa, being declined with 50% over the last 50 years, and on the Balkans – with 80% over the last 30 years. The population decline is considered related not only to negative factors operating within the breeding grounds but also along the flyway. However, relatively little is known on the ecology and threats for the species during migration and in the wintering grounds. In 2012 and 2013 a total of 19 Egyptian Vultures (1 adult and 18 juveniles from the Balkans) were tagged with satellite transmitters under the LIFE+ project “The Return of the Neophron” (www.LifeNeophron.eu). The mortality rate of the first year birds was 67%. Natural barriers, direct persecution, non-intentional poisoning and electrocution were evidenced as serious threats for the Balkan Egyptian Vultures in their wintering grounds. Capacity building in local stakeholders, NGOs and institutions, awareness campaigns to local communities, and more research on the scale and magnitude of the threats are urgently needed in order to secure the species on its wintering grounds in Sahel zone.

Biogeographic assessment of snakes of genus *Psammophis* in NW Africa, with a focus in the Atlantic-Mediterranean desert corridor

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Keywords: *Psammophis*, phylogeography, climatic cycles

North Africa suffered repeated intercalations of arid and humid conditions during the last few million years, which affected species ranges, creating isolation events followed by secondary contact. More recently, the dispersion of less aridity-adapted species is facilitated by corridors composed by highlands and water bodies. *Psammophis* is a genus of diurnal, fast-moving snakes, containing 33 species that occur mostly throughout Africa, with some species spanning the Middle East and South-Central Asia. The most common species in NW Africa are *P. schokari*, *P. elegans*, and *P. rukwae* of the *P. sibilans* species complex. The only phylogenetic study in the area was performed in *P. schokari*. In this study we aim to answer the following main questions: 1) How is the genetic variability spatially structured?; 2) Is there a Mauritanian *P. schokari* lineage? 3) Do Atlantic lineages of *P. schokari* meet? If so, where is the contact zone located?; 4) What is the phylogenetic situation of the isolated Tidra Island *P. sibilans* population? Results so far show that at least three genetic lineages of *P. schokari* occur in NW Africa, with apparently allopatric distributions. The specimen from Hoggar is similar to the Tunisian ones, both sharing a close common ancestor with Algerian specimens. A Mauritanian lineage spreads throughout the Sahelian fringe up to the Atar Mountains, and up the Atlantic coast up until a few kilometres past the border with

Morocco, where it apparently contacts with the Moroccan lineage. Mauritanian “*P. sibilans*” constitute a monophyletic entity. Tidra Island population seems recently isolated.

Stable isotopes uncover key factors of the trophic ecology of the endangered *Crocodylus suchus*

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Keywords: conservation, *Crocodylus suchus*, diet, stable isotopes

The analysis of stable isotope ratios is a powerful tool to reconstruct animals' diets since rates of consumers/predators reflect those of their prey. For species of conservation concern and with a limited knowledge of basic ecological traits, this method may be of great help for preparing guideline programs in order to protect their populations. We have examined stable carbon ($\delta^{13}\text{C}$) and nitrogen ($\delta^{15}\text{N}$) isotopes for the Saharan *Crocodylus suchus*. Scale samples from living and death crocodiles as well as from their potential prey (birds, mammals, fish and amphibians) were collected in Mauritanian *gueltas* and *tâmoûrts*. $\delta^{13}\text{C}$ values were similar between crocodiles, fish and frogs, whereas bird and mammal samples had lower values. This preliminary result suggests that crocodiles' diet would be mainly based on aquatic prey. We found different $\delta^{15}\text{N}$ values for crocodiles collected in Tagant and Afollé, this finding indicating that crocodile diets between both zones can differ. $\delta^{15}\text{N}$ values were significantly lower for *Crocodylus niloticus* collected at the Okavango Delta than those of the Mauritanian *Crocodylus suchus*. For species with similar dietary requirements, high $\delta^{15}\text{N}$ indicates the use of resources in more eutrophic water habitats. New lab analyses are needed to reconstruct Mauritanian crocodile's diet according to local baseline isotopic values and including the effect of crocodile size and the type of water body (i.e. *gueltas* and *tâmoûrts*). These conclusions will be useful to protect the habitats where crocodiles live including the water quality and the presence of their prey.

Dispersal and genetic patterns of small and isolated populations of crocodiles from the mountains of Mauritania

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Keywords: gene flow, Mauritania, microsatellites, remote sensing, water index

The spatial and genetic connectivity is paramount for the long-term persistence of small and isolated populations living in climate-extreme environments. This work aims to identify the distribution of genetic diversity, population sub-structuring and dispersal across crocodiles (*Crocodylus suchus*) occurring in small and isolated groups in Mauritanian mountains. We used both invasive and non-invasive crocodile samples collected during a series of surveys in Mauritania (2007-2012). Mitochondrial DNA and microsatellite markers were used to estimate genetic diversity, population structure and demographic parameters in relict crocodile populations. The surveys also allowed the collection of 551 water control points that were used for calibrating Normalised Difference Water Indexes. The indexes were applied on multi-temporal satellite series for deriving water availability maps. Our results showed high genetic differentiation and geographic structure of Mauritanian crocodile populations. We identified a metapopulation within each of the four study sub-basins and genetic differentiation between sub-basins with low dispersal. Effective population sizes tend to be low within sub-basins while genetic diversity is maintained. Our study suggests that hydrographic networks allow crocodiles to disperse and maintain metapopulation dynamics, attenuating the loss of genetic diversity and extinction risk. The water maps demonstrated that permanent *gueltas* and seasonal *tâmoûrts* were the most common occupied habitats,

while dispersal crocodiles were found essentially on the Gorgol and Senegal rivers. We highlight the need of hydrographic conservation to protect these vulnerable isolated individuals. We propose *C. suchus* as an umbrella species in Mauritania based on the ecological affinities shared with other water-dependent species in desert environments.

Golden jackals in North Africa: the need for an integrative approach

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Keywords: Golden jackal, Behavior, Conservation, Ecology, Genetics

The ecology and distribution of wolf-like canids are greatly influenced by humans, often raising conflicts with socio-economic, political and conservation implications. As a result, large canids like the wolf, coyote and Ethiopian wolf have been focus of extensive scientific research, comprising some of the most studied mammals in the world. In contrast, the golden jackal (*Canis aureus*) is one of the less studied canids which hamper local management or conservation policies. Despite its wide range, frequent conflict with human interests and high potential for biological novelties, there is little available knowledge on basic biology, ecology and distribution on the North African golden jackal. Nevertheless, morphological and genetic evidences suggest the need to investigate its taxonomic delimitation from other sympatric and cryptic canid species. These recent findings stimulate the long-standing controversy related to the occurrence of grey wolves in Africa and stress the urgent need for further research. Here we conduct a review on the available knowledge of golden jackals in North Africa and present the goals of a recent research topic in CIBIO that focuses on: i) phylogenetic assessment of golden jackals in North Africa; and ii) field surveys at a local scale conducted in NW Senegal, with the collaboration of local authorities (DPN), aiming to census population (using acoustic surveys, camera-trapping and non-invasive genetics), to evaluate behavioral and morphological traits, and to assess conflicts with local people. This integrative approach is expected to contribute for clarifying the ecology and systematics of African jackals.

Cheetah genetics: an overview of the past, present, and future

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Keywords: cheetah, conservation, genetics

The cheetah (*Acinonyx jubatus*) is classified as Vulnerable by IUCN and is listed under appendix I of CITES. With only about 12000 individuals spread across 22 countries, the cheetah is the most endangered of the big cats in Africa. Not only is the cheetah threatened by low numbers and fragmentation of its existing population, but it is also a species with historically low genetic diversity. Being the only species from its genus (*Acinonyx*) further increases its value to the biodiversity of the planet.

The cheetah was one of the first wild species to be studied genetically and results obtained over 30 years ago drew attention to the importance of genetics for conservation. The low genetic diversity was shown to have originated thousands of years ago and has been associated with morphological defects, reproductive defects and susceptibility to infectious disease. Since then the genetic knowledge has continued to progress. Genetic tools have been applied routinely to assess the phylogenetic relation between various cheetah populations, as well as the cheetah's immune system. The Cheetah

Conservation Fund's genetic laboratory has optimized markers and techniques to facilitate work on non-invasive samples. Thanks to recent advances the cheetah's genome has been sequenced, and the results are expected to shed light on some remaining questions on the cheetah's evolutionary past. In addition several ongoing studies have been initiated to contribute to the knowledge on some of the isolated cheetah populations, illegal trade issues, as well as several health related issues on inheritable and infectious disease.

Le loup africain *Canis lupus lupaster* au Maroc !!! Une première donnée pour la faune mammalogique du Maroc et d'Afrique

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Depuis le début du siècle, les soupçons de loups vivants sur le continent africain ont suscité l'intérêt de la communauté scientifique, des observations de canidés "grands et rares" différents du chacal doré classique ont été signalées dans Afrique du Nord.

Dans le cadre de nos travaux de recherche entre l'équipe de Recherche « Valorisation des Ressources Naturelles et Biodiversité » sous direction du Dr. Rguibi Idrissi Hamid (enseignant chercheur à la Faculté des Sciences, Université Chouaib Doukkali, El Jadida) et le Groupe de Zoologie des Vérétrés sous la direction du Dr. Vicente Urios (Enseignant chercheur à la Faculté des Sciences, Université d'Alcante, Espagne) de développer une nouvelle méthodologie d'étude des mammifères au Maroc, un groupe mal connu au Maroc, et dans un but de développer une surveillance du comportement des mammifères dans leurs milieu naturel, et les prédateurs espace d'affichage dans les régions d'Aghbala et Azilal, nous avons suivi les protocoles établis pour l'utilisation de pièges photographique. Les caméras est l'outil plus efficace et plus dynamique pour l'évaluation de la dynamique et la surveillance mammifères, en particulier dans le cas des prédateurs et d'autres espèces d'habitudes cryptiques.

Grâce aux pièges photographiques il nous est possible d'identifier des individus de loup africain, photographiés sur l'ensemble des caméras qui ont enregistré des canidés. Il s'agit de la première donnée sur le Loup et son existence au Maroc. Ces données sont d'une grande importance pour calculer les paramètres de la population du *Canis lupus lupaster* dans le Moyen Atlas Marocain. Nos recherches sur la génétique de l'espèce, sa distribution à l'échelle du Maroc et un programme de surveillance sont en cours.

Interaction between Caracal *Caracal caracal* and Local Communities in Central Iran

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Key words: Caracal, carnivore's conflict, local community, questionnaire survey

Human–wildlife conflict is one of the most critical threats for many mammalian species, particularly carnivores. Caracal is a widely distributed felid throughout central and eastern Iran, including Abbasabad Wildlife Refuge where the creature has been killed by local people in recent years. Therefore we conducted a semi-structured questionnaire survey to understand human-caracal interaction and local communities' attitude toward caracal and other sympatric carnivores. During summer 2013, we interviewed 160 households from 14 communities around the reserve. Almost half of respondents experienced livestock loss due to carnivores, partly due to caracal (18.5%) during past two years, mainly poultry (56.2%). A total of 5 caracal casualties were recorded, all caused by the human. Most of the attacks happened inside the corrals (93.9%), during nighttime (100%). However, the predator was seen in only a small proportion of caracal depredation reports (0.8%), meaning involvement of a wider range of meso-carnivores in human-carnivores conflict in the area. Enhancing livestock protection within corrals

was considered to be the best to mitigate conflict while we are aware that lethal method is also sometimes applied. It is highly recommended that parallel to community-based educational programs in order to increase people tolerance, preventive methods are needed in order to reduce human-caracal conflict in central Iran.

Mammalian carnivore survey results from the lower Draa valley, Yebel Ouarkiz and Aidar massif, Morocco

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Key words: Aidar Massif, Draa river, Morocco, carnivore mammals, survey

As a part of a long-term study in collaboration with the HCEFLCD and l'Institut Scientifique de Rabat, a preliminary survey of carnivore mammals was carried out between 2011 and 2013 in the area of Lower Draa Valley, Yebel Ouarkiz and Aidar Massiff (Morocco). It is a ca. 20.000 Km² region at the North of the Western Sahara Desert, where 13 carnivore species were previously reported. The survey was taken by seven expeditions of one week each, with 53 walking surveys and 20 camera-trapping points. Twelve species were detected whereas two others (cheetah *Acynony jubatus* and caracal *Caracal caracal*) couldn't be unequivocally confirmed. Golden jackal (*Canis aureus*), red fox (*Vulpes vulpes*), Ruppel fox (*V. rueppelli*) and wild cat (*Felis silvestris*) were easily detected (73,5-88,6 % of positive surveys). Honey badger (*Melivora capensis*) and common genet (*Genetta genetta*) were widespread but apparently uncommon (26,4-35,8% of positive surveys). Fenec fox (*V. zerda*), slender mongoose (*Galerella sanguinea*), Egyptian mongoose (*Herpestes ichneumon*), Libyan zorilla (*Ictonyx lybicus*) and sand cat (*F. margarita*) presented restricted distributions linked to specific habitats (1,8-15,1% of positive surveys). Stripped hyena (*Hyaena hyaena*) was widespread but highly uncommon (11,3% of positive surveys). Slender mongoose was documented for the first time in Morocco, and the sighting of one sand cat was the first record of the species within the study area. Specific efforts at detecting cheetah failed, but some data may suggest its presence. This information confirms this area contains among the highest diversity and abundance of carnivore mammals in Morocco.

Poster communications

ETUDE DE LA REPRODUCTION DES POPULATIONS DE TOURTERELLES TURQUE (*Streptopelia decaocto*) ET DES BOIS (*Streptopelia turtur*) DANS LES OASIS SUD-EST DES ZIBAN (BISKRA, ALGERIE)

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Mots clés : Oasis. Succès reproducteur ; Survie ; Tourterelles ; Causes naturelles

L'expansion de la palmeraie des oasis sud-est du Ziban (Biskra, Algérie), de 2 à 4 millions de palmier en l'espace d'une décennie semble avoir permis une colonisation rapide par les colombidés. Durant l'année 2008, pendant six mois, de la fin du mois de Mars jusqu'à la fin du mois d'Aout, nous avons mené des observations et un suivi régulier afin de cerner les principaux paramètres de la nidification et de la reproduction chez les tourterelles *Streptopelia decaocto* et *S. turtur*. Nous avons suivi l'activité de deux échantillons de référence, composés de $N_1=21$ nids de *Streptopelia decaocto* et $N_2=30$ nids de *S. turtur*. Les nids sont construits sur deux variétés de Palmier dattier (*Phoenix dactylifera*) : Mech degla et Deglet nour. Les hauteurs moyennes respectives des nids sont pour *S. decaocto* sont $H_{T1}= 6.11 \pm 1.006$ m ($N=14$) et $H_{T2}= 4.57 \pm 1.12$ m ($N=7$). Tandis que, *S. turtur* les hauteurs moyennes sont $H_{B1}= 5.28 \pm 1.15$ m ($N=16$) et $H_{B2}= 4.04 \pm 1.29$ m, ($N=14$). Le succès reproducteur global chez les deux espèces de tourterelles est assez homogène, il oscille entre 0,50 *S. decaocto* et 0,56 pour *S. turtur*. Il est de même pour les taux de survies journalières ($S_T = 0.9424$ pour *S. decaocto* et $S_B = 0.9511$ pour *S. turtur*). Parmi les facteurs à l'origine des mortalités importantes, nous avons noté les causes naturelles qui constituent la part la plus importante dans les échecs des couvées, elles constituent les 45,83% pour *Streptopelia turtur* et de 47,37% pour *S. decaocto*.

Nouvelles Données sur les populations naturelles de *Gazella cuvieri* (Ogilby, 1841), en Algérie

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Mots clés : *Gazella cuvieri*, état des populations, effectifs, répartition, menaces

Le suivi des populations naturelles de *Gazella Cuvieri* (Ogilby, 1841), a été conduit dans la majorité des départements fréquentés par cette antilope. L'étude consiste à un inventaire exhaustif de la plus part des départements du nord Algérien. La structure des populations a été abordée par l'évaluation des effectifs de gazelles, au cours de 2013 et 2014 dans certains départements ainsi que les milieux de prédilection avec une analyse des menaces exercées sur cet animal menacé. Les connaissances acquises vont contribuer à une meilleure gestion de ces populations.

Etat actuel des populations d'*Ammotragus lervia* (Pallas, 1766), du Nord Algérien: Répartition et menaces

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Mots clés : *Ammotragus lervia*, inventaire, répartition, menaces, nord Algérien

La présente étude porte sur l'inventaire des populations naturelles d' *Ammotragus lervia* (Pallas, 1766), au niveau du nord de l'Atlas saharien en Algérie. Les investigations ont été menées entre juillet 2013 et avril 2014, l'étude a portée sur l'inventaire des populations et de leurs biotopes, ainsi que sur les menaces fortement exercées sur cette antilope en voie de disparition compte tenue de son très faible effectif signalé. La révision de son statut s'impose compte tenue de la situation alarmante des populations recensées.

Les Habitats du Daman des rochers *Procavia capensis* dans le parc National de L'Ahagar dans la région de Tamanrasset

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Mots clés : Bioécologie, *Procavia capensis*, Hoggar, état des populations, conservation.

Cette étude porte sur l'analyse de l'habitat du Daman des rochers, « *Procavia capensis* » au niveau du Hoggar Algérien.

Le suivi consiste à l'étude et l'analyse des biotopes de prédilection et des habitats préférentiels ainsi que la répartition des populations ainsi sa distribution au niveau de cette région, Les biotopes de prédilection ont été inventoriés ainsi que leurs caractéristiques écologiques, avec une analyse du couvert végétal. Les résultats obtenus vont servir à une meilleure gestion de ces populations en vue d'une meilleure conservation de l'espèce.

Dragonflies from Mauritania: past, present and future

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Keywords: Odonata, historical records, biodiversity, freshwater habitats

Mauritania is a good example of a region where biodiversity has been poorly investigated, as a consequence of its remoteness, harsh terrain and frequent civil unrest. The knowledge about Mauritanian dragonflies (Odonata) illustrates fairly well the scarcity of biological data. Contrasting with other Great Maghreb countries (namely Morocco, Algeria and Tunisia), information on Odonata of Mauritania was almost inexistent before the middle of the twentieth century, when they were first studied by Fraser (1952) and Aguesse & Pruja (1958). The only previous data published was a single record of *Palpopleura deceptor* (Calvert, 1899) by Lacroix (1924) from the Guidimaka province. Later, Dekeyser & Villiers (1956) published three sporadic records, and a new record of a migrant adult of *Anax ephippiger* (Burmeister, 1839) was reported by Monod (1958). Knowledge increased substantially with the works of Dumont (1976, 1978a, 1982), that added relevant distribution data and zoogeographic considerations about the Mauritanian Odonata. Since then, only Waterston (1984) added data on this subject with the first record of *Azuragrion vansomerani* (Pinhey, 1956) (sub *Enallagma vansomerani*). Until recently, nineteen species were known to occur in the country. However their extent of occurrence remains poorly understood: nine species were known from a single record and only three had slightly more than 10 observations. The current knowledge on Odonata from Mauritania is updated with the addition of several species recorded for the first time in the country.

Inventaire des plantes hôtes de la mineuse de la tomate ; *Tuta absoluta* (Povolny, 1994), dans la région de Biskra

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Mots clé : *Tuta absoluta*, hôtes secondaires, lutte biologique, Biskra

La mineuse de la tomate est l'un des principaux ravageurs de la tomate, en raison des dommages qu'il cause et l'absence de méthodes écologiquement acceptable pour son contrôle (Ferrara *et al.*, 2001). Elle présente un potentiel de destruction élevé et attaque toutes les parties de la plante dans tous les stades de développement (Caffarini *et al.*, 1999).

La tomate est la principale plante hôte de la *Tuta absoluta*, mais il y a d'autres plantes hôtes secondaires ou occasionnelles qui peuvent jouer un rôle important dans la dissémination de ce ravageur surtout dans la période où la plante hôte principale est absente. Le but recherché dans ce travail est de vérifier quelles sont les plantes aptes à héberger *Tuta absoluta* dans la région de Biskra afin de limiter son développement.

Pour atteindre notre objectif, des pièges à phéromones ont installées dans plusieurs sites, pour bien avoir une idée sur l'évolution de l'insecte.

En se basant sur les périodes actives du ravageur, la vérification des plantes visuellement et avec une loupe de poche, sur le pourtour des serres, sous serres, au-dessous des palmeraies et dans les cultures en plein champ, dans ces sites, nous a permis d'identifier des plantes infestées par *Tuta absoluta*.

Les plantes infectées sont photographiées avec un appareil numérique, puis mises dans des sachets en papier kraft pour la vérification des symptômes par la loupe binoculaire au laboratoire.

Pour la confirmation de ces résultats, les plantes infestées sont couvertes par des mailles contre insecte avec une densité minimale de 9 x 6 fils/cm², dont l'objet de capturer l'adulte qui se développe, la genitalia confirme les résultats.

La vérification des plantes nous a permis d'identifier dix espèces végétales infestées par *Tuta absoluta*. Ces plantes comptent cinq espèces sauvages et cinq cultivées. Ces espèces appartiennent à quatre familles, qui sont : *Solanaceae*, *Amaranthaceae*, *Chénopodiacées* et *Légumineuse*.

Phénologie de la reproduction du ganga unibande dans la région d'Eloutaya

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Le ganga unibande (*Pterocles orientalis*) appartient à la famille des Pteroclididae. Le genre *Pterocles* se rencontre à travers le nord, l'est et le sud de l'Afrique ainsi qu'à Madagascar, le Moyen Orient, l'Inde et à travers l'Asie centrale et l'extrême sud-ouest de l'Europe (Péninsule Ibérique et le Midi de la France). En Algérie nous ne disposons pas d'acquis propre sur le ganga unibande (*Pterocles orientalis*). C'est pour cela que nous avons mené cette étude dans la région des zibans (wilaya de Biskra). Dont nous avons prospecté la majorité des sites de présence de cet espèce et effectué des recensements ainsi que nous avons suivi la reproduction durant l'année 2013 du ganga unibande dans le site d'Eloutaya. Les résultats de la recherche menée sur terrain sur la reproduction nous ont permis de repérer les premiers couples vers le mi-mars ainsi de localiser sept nids (n=7) dont six nids contiennent 3 œufs et un nid contient 02 œufs. Nous avons estimé la date des premières pontes vers la deuxième semaine du mois d'avril et les dernières pontes vers la fin août et début septembre, nombre d'œuf éclos (n=18) et la taille de ponte varie de 2 à 3 œuf avec un taux d'éclosion d'environ 90%.

Ces résultats sont comparables à ceux obtenus pour d'autres populations d'Afrique du Nord par Urban *et al* (1986) et Znari *et al* (2008).

Wildlife poisoning in northern Morocco, a first approach

Guinda, M.A., Godino, A., & Garrido, J. R

In Morocco, during the 20th century and even currently has been a strong decline and extinction process of many mammalian predators and raptors, which could be linked to the use of poison. Northern Morocco is a very important area for endangered raptors, since it is the main migratory route of the Western

Palaearctic for several species (Egyptian vulture *Neophron percnopterus* and Eurasian Griffon Vulture *Gyps fulvus*), and a dispersal area for endangered Iberian populations of Cinereous Vulture *Aegypius monachus* and Spanish Imperial Eagle *Aquila adalberti*. On the other hand, there might be still two relict extant populations of Red Kite (*Milvus milvus*) and Egyptian Vulture.

The Andalusian Anti Poisoning Programme has undergone an initiative (funded by Andalusian Government through the E.U. POCTEFEX project) to evaluate the importance of vulture-poisoning locally through bibliographical review, fieldwork and enquiries addressed to local stakeholders (environmental authorities, protected areas managers, veterinary service, environmental NGOs, hunters and hunters associations, livestock managers and shepherds, etc.). The project aims to assess the existence of poisoning as a real wildlife threat and what motivations and causes may lead poisoning in this region. The outputs will allow decision-making process to minimize the impact of this practice on endangered wildlife in this region, if needed.

Preliminary results obtained, indicate that wildlife poisoning do not seem to be a major concern at the time being, though it could be potentially harmful for relict populations of Egyptian Vulture and Red Kite. Local poisoning detected was to target Wild Boar (*Sus scrofa*) and Golden Jackal (*Canis aureus*).

The Cheetah Conservation Fund: a multifaceted approach to cheetah conservation

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Keywords: cheetah, *Acinonyx jubatus*, conservation, research, education

The cheetah (*Acinonyx jubatus*) is the only species from its genus (*Acinonyx*). It is classified as Vulnerable by IUCN and is listed under appendix I of CITES. With only about 12000 individuals spread across 22 countries, the cheetah is the most endangered of the big cats in Africa. Currently, only Namibia and Botswana have adult population sizes above 1000 adult individuals.

Across the range, common threats to extinction include habitat loss, fragmentation and degradation, as well as interspecific competition and human-wildlife conflict. In Namibia in particular, the majority of the cheetahs live on farmland, therefore human-wildlife conflict resolution is a key to the survival of the species, and conservation efforts need to be multifaceted, encompassing environmental as well as social components.

Founded in 1990 by Dr Laurie Marker, the Cheetah Conservation Fund (CCF) has set the global standard for cheetah conservation. CCF approaches conservation holistically by conducting research, providing education, and employing numerous innovative conservation initiatives such as the Livestock Guarding Dog Programme to reduce human-wildlife conflict in a non-lethal manner, and Bushblok to reduce bush encroachment while at the same time providing employment and producing an environmentally friendly fuel log. CCF is based in Namibia, but its work extends globally through collaborations, legislation, and international training programmes. CCF works tirelessly to ensure the long-term survival of the cheetah and has made significant progress towards that goal by employing programmes that improve livelihoods while concurrently protecting wildlife.

Répartition des populations de Goudi de l'atlas *Ctenodactylus gundi* dans la région des Aurès

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Mots clés : *Ctenodactylus gundi*, répartition géographique, Habitats, Aurès Algérien

La répartition géographique de *Ctenodactylus gundi* a été analysée pour la première fois dans la région de Biskra ainsi que les caractéristiques des milieux et d'habitats de ce mammifère sur toute la région des Aurès avec une analyse du couvert végétal, l'examen des pressions anthropiques sur cet espèce a été observée et analysée en vue de prévoir les possibilités d'une meilleure préservation durable de cet espèce menacée de disparition.

Exigences énergétiques chez les poussins de la perdrix gabra (*Alectoris Barbara*, BONNATERRE, 1792) et structure de la population au niveau de la réserve de chasse de Zéralda - Algérie

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Mots clés : Perdrix gabra, énergie métabolisable, population, densité, biologie, écologie, Algérie

La survie des jeunes des oiseaux Galliformes, comme la Perdrix gabra (*Alectoris Barbara*, BONNATERRE, 1792) dépend essentiellement de la disponibilité, de l'accessibilité et de la stabilité des ressources alimentaires. Pour mettre en évidence ce trait essentiel à cette espèce vis-à-vis des exigences intrinsèques au niveau de structure de la population, nous avons mené pendant 3 ans (2011 - 2012 - 2013) deux volets de recherches complémentaires :

- le premier a permis de mettre en évidence les besoins énergétiques chez les poussins de deux lignées : l'une à croissance rapide et l'autre à croissance lente. Nous avons suivi des oiseaux pendant 10 semaines avec des mesures quotidiennes de la prise alimentaire. Cela a révélé que l'énergie métabolisable, chez la lignée rapide et lente s'exprime avec des écarts importants de l'ordre 32 et 28 kcl/j.
- La deuxième recherche sur les densités et la taille de ponte est menée par des observations directes au niveau des 600 ha de la Réserve de chasse de Zéralda (Algérie). Les estimations de notre population moyenne se situent au niveau 11,22 couples/100 ha et la taille de ponte moyenne est de 11,8 œufs/nid. La survie en été, varie de 5 à 18 oiseaux, avec un âge ratio (Jeune/Adulte) de 5,6.

Ces résultats préliminaires montrent l'importance de la disponibilité des ressources alimentaires et leurs stabilités pour assurer la couverture des besoins des oiseaux pendant la phase clé de développement. L'augmentation de la capacité d'accueil au niveau de la réserve de chasse devrait passer par des aménagements permettant d'augmenter la biodiversité et les ressources.

Capacity building for Egyptian Vulture research and conservation in eastern Sahel

Stoyan Nikolov

Bulgarian Society for the Protection of Birds

Based on the alarming situation with Egyptian Vulture (*Neophron percnopterus*) on the Balkans, a project aiming to facilitate the undertaking of conservation measures for the migratory populations of species wintering in eastern Sahel was implemented in 2013. The build capacity among African conservationists to work with the species by broaden the understanding on the Egyptian Vulture problems and provide training on species-specific research and conservation methods in Africa. The project also initiated surveys on the wintering numbers, ecology and limiting factors in two of the main so far known wintering areas of the Balkan population in Sudan and Chad. The results of the survey provided important information about vulture's wintering territories and threats in eastern and central Africa. Two training Seminars (with theoretical and practical parts) were organized in Ethiopia and Bulgaria to share information and exchange experience for the conservation actions and practices important for the prevention Egyptian vulture extinction. A total of 32 conservationists from 11 countries (Chad, Sudan, Ethiopia, Somalia, Djibouti, Bulgaria, Greece, FYROM, Albania, Turkey, and United Kingdom) took participation in the seminars. The activities were supported by the CMS-Raptors MoU small scale project for capacity building in Africa and the LIFE+ project "The Return of the Neophron".

The status of Eleonora's Falcon (*Falco eleonora*) in Morocco

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The PhD project aimed to co-ordinate and implement high priority actions for *Falco eleonora*, (Eleonora's falcon) for the effective, long-term conservation of the species in Morocco.

A national population survey was conducted during the breeding seasons 2010-2011 and 2014 in order to assess the species' breeding distribution and population size.

Standard field protocols, described in the International Species Action Plan, breeding success and a GIS interactive database were developed.

The results of this national program survey, provided guidance for reviewing the conservation status of Eleonora's Falcon in Morocco and baseline information for future monitoring of its population.