

Research Article

Illegal wild bird trade, and related bird movements, between Sub-Saharan Africa and the North Africa

Mohamed Nadjib Benzohra^{1*}, Sahnoon Felah², Mounia Baha¹

¹ Key Laboratory of AnimalEcobiology, ENS Kouba, 16308 Vieux Kouba, Alger, Algeria.

² Key Laboratory of Research on Biological Systems and Geomatics Laboratory, University of Mascara, Mascara, 29000, Algeria

(Received: February 06, 2023; Revised: March 07, 2025; Accepted: March 11, 2025)

ABSTRACT

Illegal wild bird trade significantly impacts biodiversity, with street markets and virtual online marketplaces serving as major trade hotspots. Due to its illegal character, it is impossible to estimate how many individuals and how much money are handled. Transporting animals through illegal trade poses health risks to humans and livestock, as these animals do not undergo quarantine. We use the example of North Africa, the southern region of Algeria and the markets at the northern borders of Mali and Niger, a route known for illegal wildbirds trade. We present information on illegal trade practices in wild birds and new methods of marketing and transport, identifying the species and telling us which species are preferred and why? We observed 12 species on sale, a total of 8011 wild birds in four years and more than 21,262 purchase requests in online platforms. A large purchase request was on *Psittacus erithacus*, *Serinus mozambicus* and *Crithagra leucopygia*. The investigation involved indicates that the illegal trade in wild birds is important in the North African markets, be in the physical market or in online platforms. Both platforms must be taken into account in the control of these markets.

Keywords: Markets, illegal, online platforms, Mali, Niger.

INTRODUCTION

Wildlife crime is a major concern for biodiversity conservation and the sustainable development of many countries worldwide (Agbatan *et al.*, 2024). One of the forms of this crime is wildlife trafficking which has sharply increased during the last decade (Banjade *et al.*, 2020). Wildlife trafficking has grown to the point that it is threatening the survival of some of the world's most iconic species (Kurland *et al.*, 2017, van Velden *et al.*, 2018). Illegal wildlife trade is a widespread activity with direct impacts on biodiversity and street markets are frequently pointed out as hotspots in the wildlife trade route. However, due to its illegal character, it is difficult to accurately estimate how many individuals and how much money are handled by traders (Rodrigo 2011, Barber-Meyer, 2010). The wild bird trade has been linked to a number of issues on conservation, economic and human health concern, including the establishment of alien species (Cassey *et al.* 2015; Cardador *et al.* 2017)

The trafficked animals may also pose a problem to human and livestock health, since they do not undergo sanitary inspections, representing potential vectors of diseases, such as yellow fever, avian influenza, rabies, toxoplasmosis, and tuberculosis (Borm *et al.*, 2005; Weldon *et al.*, 2004). However, formal operations have been drastically reduced since Algeria imposed a ban on wild bird imports. North Africa absorbs most wild bird in clandestine transport both from within the region and elsewhere. The Sub-Saharan of Africa is the source of these birds' poachers and sold illegally in the

north of Africa. The threat of the illegal wildlife trade to the African continent has grown in recent years with the rise in demand for illegal wildlife trade products (Christopher *et al.* 2018)

Unregulated commercial trade and unsustainable harvesting from wild populations lead to increased extinction risks for many taxa around the world (Tingley *et al.* 2017). This report summarizes the results of a consultancy to analyses the volumes and dynamics of illegal trade in live wild bird species, between Sub-Saharan and the North Africa. And, it tries to give very precise information so that we can control them, with the risk of transmitting new disease to the north, do not apply quarantine of this birds.

MATERIALS AND METHODS

This study is based on an assessment surveys and statistics on wild birds, taken as meaning all the species of bird under illegal trade that originate in the wild. A survey was conducted through specially designed forms. We have collected market research data on the bird trade in northern Mali (Kidal, In Khalil) northern Niger (As-samaka), southern Algeria (Borj Badji Mokhtar, Taman-rasset) and northern Algeria (Djelfa, Blida, Tebessa, Sidi Bel Abbes). We carried out this study by practicing the bird trade, so that we can have well-taken information and be in direct contact with the poachers and the smugglers. We recorded survey dates, total birds observed, species. we also collected data on temporal, and price. We surveyed the presence of wild birds between 2016 and February 2020. We visited bird markets twice a week in North Africa. We visited the markets of

*Corresponding Author's E-mail: nadjib-22@hotmail.com

southern Algeria in the months of March and April. We collect the data in the north of Mali and Niger according to the smuggling. In each market, we observed whether there was direct or disguised exposition of wild birds for trade. In each visit, we recorded number of birds sold and their prices. Online survey:

The increasing use of the internet in the trade of wildlife, is a major challenge for effective regulation of trade (Sajeve *et al.*, 2013; Lavorgna, 2014). A variety of online platforms, including online marketplaces and social media sites, are used by both legal and illegal traders to facilitate communication with suppliers and customers (Lavorgna, 2015; Harrison *et al.*, 2016; Bergin *et al.*, 2018). A search for pet groups was conducted on Facebook using search terms, in Arabic French and English. There are several approaches in conducting Facebook market surveys (all Facebook groups for wild birds in north Africa). While other studies do not specify methods carried out for data collection but choose not to disclose specifics of forum name such as site name and address (Sung and Fong, 2018).

We joined this groups and conducted monitoring online from 2016 to 2020. we collected data on birds recorded species, the number of individuals, price, date, and any information that may inform on trade. A search for online platforms, including online marketplaces.

For online survey we were all the time on the online marketplaces and facebook market of birds. Sometimes like a bird buyer to get the prices and sometimes as bird sellers to test the demand on different species of birds. We identified the bird species using specialized literature (Sigrist, 2009), or by comparison with digital sources (Wikiaves, 2011),

RESULTS

From January 2016 to April 2020, we found 12 species of bird under illegal trade *Poicephalus gulielmi*, *Psittacus erithacus*, *Psittacus timneh*, *Poicephalus senegalus*, *Psittacula krameri*, *Uraeginthus bengalus*, *Euplectes orix*, *Serinus mozambicus*, *Crithagra leucopygia*, *Vidua macroura*, *Lagonosticta senegala*.

Table 1. Birds species and abundance found on illegal trade during the period of 2016 to 2019, and mode of transportation (%).

	Birds Offer for sale Individu/year					Mode of transportation (%)	
	2016	2017	2018	2019	Total	by landline	by airway
<i>Poicephalus gulielmi</i>	23	53	0	0	76	86	14
<i>Psittacus erithacus</i>	325	403	321	569	1618	69	31
<i>Psittacus timneh</i>	51	24	35	52	152	72	28
<i>Poicephalus senegalus</i>	298	69	655	120	1142	94	6
<i>Psittacula krameri</i>	156	52	45	30	233	92	8
<i>Uraeginthus bengalus</i>	0	0	0	125	125	89	11
<i>Euplectes orix</i>	154	65	126	28	373	89	11
<i>Serinus mozambicus</i>	785	869	523	456	2660	95	5
<i>Crithagra leucopygia</i>	236	215	324	187	962	95	5
<i>Lagonosticta senegala</i>	0	0	305	0	305	96	4
<i>Vidua macroura</i>	80	45	19	68	212	76	24
<i>Amadina fasciata</i>	63	54	12	24	153	96	4
Total	2171	1749	2365	1660	8011		

According to the table (1) there is a difference between the species of birds and the rate of illegal trade ($p < 0,001$). Throughout the four years study period, 76 individuals of *Poicephalus gulielmi* have been observed. In 2016 and 2017, on the other hand, no individual was reported. Between 2016 and 2019, the same observation for *Psittacula krameri* was

233 individuals reported. But for *Psittacus erithacus*, *Poicephalus senegalus*, *Crithagra mozambica* and *Crithagra leucopygia*, the illegal trade is regular each year we observe almost the same number, for *Uraeginthus bengalus* (reported in 2019) and *Lagonosticta senegala* (reported in 2018) they are not often found on the market.

Table 2. the number of buyer orders for each bird species on Facebook market and Ouedkniss online markets between March and June (2019) in the north of Africa. (The largest proportion of the buyer orders between 01 and 03 specimens).

Species	Purchase order
<i>Poicephalus gulielmi</i>	260
<i>Psittacus erithacus</i>	3667
<i>Poicephalus senegalus</i>	869
<i>Psittacula krameri</i>	456
<i>Uraeginthus bengalus</i>	68
<i>Euplectes orix</i>	124
<i>Crithagra mozambica</i>	8746
<i>Crithagra leucopygia</i>	6874
<i>Lagonosticta senegala</i>	140
<i>Vidua macroura</i>	58
<i>Amadina fasciata</i>	00

We see in the table 02, a lot of demand on three species *Crithagra leucopygia*, *Crithagra mozambica* and *Psittacus erithacus*.

This table gives an explanation of the result in table 01. When the highest number is the most demand species, the law of the market.

Table 3. Percentage of wild bird mortality in North Africa.

	The percentage of mortality in North Africa
<i>Psittacus erithacus</i>	05
<i>Crithagra mozambica</i>	36
<i>Crithagra leucopygia</i>	52

Table 4. The variation of birds prices in Euros in the different observations.

	The average price in North Africa		The average price in Tamanrasset		The average price in the north of the sahel
<i>Poicephalus gulielmi</i>	50,417	±7,821	40	±8,528	5
<i>Psittacus erithacus</i>	135,833	±27,372	107,5	±13,568	25
<i>Poicephalus senegalus</i>	27,5	±7,538	17,5	±7,538	4
<i>Psittacula krameri</i>	12,917	±3,343	6,333	±0,985	4,5
<i>Uraeginthus bengalus</i>	7,5		4,5		2,5
<i>Euplectes orix</i>	21,667	±4,438	21,667	±4,438	6
<i>Crithagra mozambica</i>	16,75	±9,164	11,75	±7,325	1,5
<i>Crithagra leucopygia</i>	22,917	±7,748	17,917	±6,895	0,5
<i>Lagonosticta senegala</i>	7		5		0,5
<i>Vidua macroura</i>	25		22		2

According to the table (04), there was a significant positive correlation ($P < 0.001$) between observation areas for illegal trade in birds and the prices also observed as a whole. the price of *Psittacus erithacus* was the highest ($89,444 \pm 50,664$ Eros). We have not observed variability in prices in the north of Sahle. We have not observed variability in prices in the north of Sahle. Low

prices of birds in the Sahle region is due to the abundance of these birds in the wild and the poverty and rarity of bird breeders, but in North Africa wild birds do not belong to the range for these species, the risk of smuggling these birds between southern and northern Africa and the mortality (table 03) rate among transported birds is not yet adapted to life of captivity are causing of price rising in North Africa.

Table 5. the variability of bird prices (Euros) over the different months.

Prices (Euros)						
	<i>Psittacus erithacus</i>	<i>Poicephalus senegalus</i>	<i>Euplectes orix</i>	<i>Crithagra mozambica</i>	<i>Crithagra leucopygia</i>	
January	172,9 $\pm 14,062$	38,6 $\pm 07,556$	26 $\pm 04,195$	30,125 $\pm 02,522$	26,286 $\pm 01,666$	
February	113,3 $\pm 13,744$	31,50 $\pm 05,513$		29,375 $\pm 01,996$	25,714 $\pm 01,278$	
March	97 $\pm 06,278$		25,7 $\pm 02,900$	9,813 $\pm 02,474$	10,214 $\pm 02,136$	
April	93,7 $\pm 05,052$	24,9 $\pm 04,061$	24,9 $\pm 01,136$		7,214 $\pm 0,647$	
May	106,6 $\pm 06,236$	19,7 $\pm 05,650$	24,5 $\pm 01,746$	8,25 $\pm 0,968$	21,571 $\pm 01,294$	
June	139,1 $\pm 07,592$	18,6 $\pm 04,820$	23,4 $\pm 01,625$	8,75 $\pm 01,561$	23,857 $\pm 03,182$	
July	141,6 $\pm 08,250$	19,7 $\pm 04,945$	21,3 $\pm 01,676$	11,75 $\pm 01,561$	24,286 $\pm 01,485$	
August	140,8 $\pm 08,122$	21 $\pm 03,826$	14,4 $\pm 01,625$	15,5 $\pm 0,866$		
September	150 $\pm 07,071$	22 $\pm 02,425$		16 $\pm 01,225$	24,857 $\pm 02,231$	
October	148,3 $\pm 09,860$	30,2 $\pm 04,008$	16,4 $\pm 01,562$	22,125 $\pm 01,615$	28 $\pm 04,408$	
November	146,2 $\pm 11,016$		20,8 $\pm 02,315$	22,5 $\pm 01,658$	31,143 $\pm 0,99$	
December	183,7 $\pm 23,374$	40,2 $\pm 02,730$	23,8 $\pm 02,676$	30,875 $\pm 0,781$	32,571 $\pm 02,259$	

According to the table we observe that the price of birds changes with the months ($P < 0.001$), prices increase in December and January and fall in May and April, for all species except one exception for *Euplectes Orix*.

DISCUSSION

Wild birds trafficking has become a major business, and the wild birds that attract are very expensive in the North African black market (CITES Secretariat, 1996, Holden 1998, Brochet et al 2016, Martin 2017, Boudebouz 2018, Amari 2018). In our survey it was observed that the majority of wild bird species transported by land (Table 1), .Nannette et al (2011) transport of goods by land in Sub-Saharan Africa. The number of birds observed has 8011 birds in four years, divided into 12 species (Table 1). The trade in wild birds from Sub-Saharan Africa is very old from the Roman periods (Zlatozar 2018, Michel, 2015) to the present day. The volume of species traded and the means of trade have changed over time (Penthai et al 2020).

During four months we received over 21262 requests to purchase wild birds on Facebook market and online markets (table 3). As part of increased globalization, trade of wildlife on online platforms has become increasingly popular and for several taxa now has overtaken the trade in physical markets (Sung and Fong 2018; French 2019, Penthai et al 2020).

In this survey, more than 1,618 of *Psittacus erithacus* () were display for sale, Martin (2017) reported that unreported illegal trade and trade within domestic markets suggest that the true numbers of parrots trapped may be considerably greater than the 1.22 million reported . The African grey parrot is highly sought after because it can imitate human speech. Parrots (order Psittaciformes) have long been trapped in large numbers in the wild for the international pet bird trade (Beissinger, 2001). In another investigation by Rowan et al (2018) despite a changing regulatory environment, this included a suspension on exports of Grey parrots from Democratic Republic of the Congo in 2016 with an exception made for 1600 specimens. According to sellers we estimated 1 in 20 wild parrot would arrive dead in North of Africa. The number of deaths cannot be calculated for distances of over 3,500 km, and takes into account poor transport conditions. Moreover, trade conditions are frequently degrading: animals are caged in overcrowded compartments, without water and food, and suffer stress, fights, mutilations and death (Renctas, 2001; Traffic, 2011). In addition, high levels of pre-export mortality of parrots in reported trade (Clemmons 2003; Hart 2013).

According to table 03, we observed a large demand in the online market for African Gray Parrots. Most buyers look for parrots to breed and others as a companion animal. *Psittacus* parrots can be bred in

commercial quantities in captivity, the relative ease with which large numbers can be captured from the wild and transported to markets means that wild-sourced birds have remained a common source of pet birds as well as breeding stock for aviculturists (Martin 2017). Low online purchase demand for *Poicephalus senegalus* and *Psittacula krameri* (table 03), they are not very expensive on the black market, because of the abundance of other species that have the same character, in bird markets in North Africa and are the results of captive breeding and become domestic species (*Nymphicus hollandicus*, *Platycercus icterotis*, *Psephotus haematonotus*).

Two other wild bird species (*Crithagra mozambica* and *Crithagra leucopygia*) with a significant number exposed in the black market and a great demand for purchase in the online market (table 1 and 2), the same results observed by Amari et al (2018). Both species have a wide range in Africa, the male has a melodious song that can be heard during the mating season. Generally, birds are kept as pets because of their beauty, lively coloration, melodious songs. North African bird lover is passionate about birds songs. Future illegal trade is best explained by a demand for birds based on their popularity and of particular species, and a consumer profile characterized by higher socio-economic and educational backgrounds (Joana, 2019).

We results shows the prices of African Grey Parrots in North Africa in the illegal trade is on average 135.83 Euros. Martin (2018) analyzed legal trade activity during a four-year period (2014-2017) African Grey Parrots prices on average 180 Euros in North Africa. Prices in the black market in the North of Sahel, average 25 Euros, on the other the prices in the export market in Democratic Republic of the Congo 140 Euros according to Martin (2018). An increase in the price of African Grey Parrots between North of Sahel and North Africa is 110.5 Euros, because the traffickers take a great risk of displacement towards the north. Moreover, the protection status of these species based on the IUCN red list (IUCN, 2011) and Algerian legislation (Executive Decree No 12-235 of 24 May 2012), the legislations accuses poachers of prison terms and fines. The prices of parrots between the years 2008, 2009 and 2010 in the North African markets is between 30 and 35 Euros in the months of March and April, prices are multiplied in 2019, due to political and security instability in northern Mali, according to Walther (2014), Informal trade in northern Mali is undergoing a triple crisis: a drop in demand due to the flow of refugees and displaced persons since the start of 2012, a drop in supply due to the migration of traders, a closure of the Algerian border which has drastically reduced commercial volumes since early 2013.

During our investigation in the south of Algeria we noticed that the prices of birds dropped during the months of March, April and Mai (table 5), in relation to the season of trade in fruits imported from the Sahel that is allowed. It is a system set up by Algerian authorities to try to normalize trade based on the traditional trade ties between Algeria and West Africa dating from long (Section 128 of the Finance Act 1994 and the Decree Inter). Fruits from Mali and Niger are allowed (Sami et al 2015), We have observed that the poacher uses the trucks that transport the fruit to get past the wild birds. Trade in wild animals do not hesitate to take security measures for the zoonotic disease hotspot, the illegal trade in wild birds has contributed to the development of certain zoonoses. The illegal trade of wild birds in our survey ranges from small-scale local barter to

international markets, this illegal trade increases the risk of transmission of virus between the countries of the Sahel and North Africa. Physical wildlife markets are being potential source as a zoonotic disease hotspot (Karesh et al 2005). The zoonoses associated with wildlife trade, (2002-2003 SARS-CoV, 2004-2014 Simian Foamy Virus and Herpesvirus, 2014-2016 and 2018-2020 Ebola Virus, 2019 SARS-CoV 2), humans who frequent wildlife markets may increase their risk of contamination (Pervaze et al 2020). In 2019, an outbreak of a novel coronavirus (COVID-19), was linked to Huanan wet market in Wuhan, China (Yee et al 2020), the Chinese government to impose a comprehensive ban on the trade and consumption of wild animals, with the exception of for medicinal purposes (Xinhua News 2020).

CONCLUSION

We cannot give the exact figure of the wild birds in the illegal trade, estimating the full scale of illegal wild bird trade remains challenging due to its underground nature, but we can be in contact with the poachers and inspect the physical places of the bird trades. The evolution of illegal wild bird trade to online platforms in us recommends enforcement of wild bird's trade laws and for the control of certain zoonoses. We need to protect the diversity of birds with a sustainable development.

REFERENCE

- Amari A, Guenifi A, 2018. Evaluation de l'importance des activités de la capture illégale des oiseaux sauvages dans la région de Guelma. Ecologie et Génie de l'environnement. University 8 Mai 1945 Guelma. Algeria. article/dn2413 (accessed June 17, 2002) assessment based on expert knowledge. Biodiversity and Conservation 28: 3343–3369. **URI:** <http://dspace.univ-guelma.dz:8080/xmlui/handle/123456789/1662> Agbatan M, Ogoudje I, Amahowe L, Gbenato H, Olou L, 2024. Role of local markets in illegal wildlife trade and conservation efforts for trafficked species. Global Ecology and Conservation. 54: 123-134. <https://doi.org/10.1016/j.gecco.2024.e03110>.
- Banjade M, Adhikari P, 2020. Illegal wildlife trade in local markets of Feuung and Mad districts of Vientiane Province, Lao People's Democratic Republic J. Asia-Pac. Biodivers., 13:511-517. <https://doi.org/10.1016/j.japb.2020.07.006>.
- Barber-Meyer, S.M., 2010. Dealing with the clandestine nature of wildlife trade market surveys. Conserv. Biol. 24, 918–923.
- Beissinger, S.R., Reynolds, J.D., Mace, G.M., Redford, K.H., Robinson, J. G. 2001. Trade of live wild birds: potentials, principles and practices of sustainable use. In: (Eds.), Conservation of Exploited Species. Cambridge University Press, Cambridge, UK, pp. 182-202.
- Bergin, D., Atoussi, S., Waters, S., 2018. Online trade of Barbary macaques *Macaca sylvanus* in Algeria and Morocco. Biodivers. Conserv. 27, 531-534. <https://doi.org/10.1007/s10531-017-1434-5>. doi:10.1007/s10531-017-1434-5.
- Borm, S.V., Thomas, I., Hanquet, G., Lambrecht, B., Boschmans, M., 2005. Highly pathogenic H5N1 influenza virus in smuggled Thai eagles, Belgium. Emerg. Infect. Dis. 11, 702–705. doi: 10.3201/eid1105.050211

- Boudebboz Ali 2018. Évaluation de l'importance du commerce des animaux sauvages online - Algérie- .Ecologie et Génie de l'environnement. 8 Mai 1945 University Guelma. Algeria.
- Cardador, L., Lattuada, M., Strubbe, D., Tella, J. L., Reino, L., Figueira, R., and Carrete, M. (2017). Regional bans on Wild-Bird Trade Modify Invasion Risks at a Global Scale. *Society for Conservation Biology*, 10, 06 <https://doi.org/10.1111/conl.12361>
- Cassey, P., Vall-Iloera, M., Dyer, E., and Blackburn, T. M. 2015. The biogeography of avian invasions: history, accident and market trade. In 'Biological Invasions in Changing Ecosystems Vectors, Ecological Impacts, Management and Predictions.' (Ed. P. Cassey.) pp. 37 – 54. <https://doi.org/10.1515/9783110438666-006> Christopher, V and Alex, V, 2018, Tackling Illegal Wildlife Trade in Africa Economic Incentives and Approaches, Illegal Wildlife Trade, Chatham House.
- CITES Secretariat (1997). Review of Alleged Infractions and Other Problems of Implementation of the Convention. Report to the Tenth Conference of Parties to CITES. Unpublished report.
- Clemmons, J. R. (2003). Status survey of the African Grey Parrot (*Psittacus erithacus timneh*) and development of a management program in Guinea and Guinea-Bissau. Unpublished report to the CITES Secretariat, Geneva.
- Department of Border Region Studies Working Papers 1. <https://doi.org/10.1079/cabicompendium.67079>
- French H. 2019. Protecting the planet in the age of globalization. Routledge. Vanishing borders.
- Harrison, J.R., Roberts, D.L., Hernandez-Castro, J., 2016. Assessing the extent and nature of wildlife trade on the dark web. *Conserv. Biol.* 30, 900e904. <https://doi.org/10.1111/cobi.12707>.
- Hart, J. (2013). Monitoring and ecology of African Grey Parrot in Orientale and Maniema Provinces, Democratic Republic of Congo. In 'Strengthening Capacity for Monitoring and Regulation of International Trade of African Grey Parrot.' Report to CITES, October 2013. pp. 39–44. (CITES: Geneva.). doi.org/10.1016/j.gecco.2021.e01964
- Holden MH, McDonald-Madden E. 2017. High prices for rare species can drive large populations extinct: The anthropogenic Allee effect revisited. *Journal of Theoretical Biology* 429:170e180. doi.org/10.1016/j.jtbi.2017.06.019.
- Jane H. 1998. A reference manual on illegal wildlife trade and prosecutions in the United Kingdom. The Royal Society for the Protection of Birds, The Lodge, Sandy, Beds SG19. [doi:10.1007/s10610-015-9273-y](https://doi.org/10.1007/s10610-015-9273-y)
- Joana R, Luís R, Stefan S, Diederik S, 2019. Trends in legal and illegal trade of wild birds: a global assessment based on expert knowledge *Biodiversity and Conservation* 28(4) .doi:10.1007/s10531-019-01825-5
- Lavorgna, A., 2014. Wildlife trafficking in the Internet age. *Crime Sci.* 3, 1e12. <https://doi.org/10.1186/s40163-014-0005-2>.
- Lavorgna, A., 2015. The social organization of pet trafficking in cyberspace. *Eur. J. Crim. Pol. Res.* 21, 353e370 [doi:10.1007/s10610-015-9273-y](https://doi.org/10.1007/s10610-015-9273-y).
- Martin R O 2017, Grey areas: temporal and geographical dynamics of international trade of Grey and Timneh Parrots (*Psittacus erithacus* and *P. timneh*) under CITES, *Emu - Austral Ornithology*, 31: 68-89. [doi:10.1080/01584197.2017.1369854](https://doi.org/10.1080/01584197.2017.1369854)
- Michel Christol 2015. L'Empire romain en Afrique : aspects et résonances d'un impérialisme. *Cahiers d'histoire. Revue d'histoire critique.* 128:19-35. doi.org/10.4000/chrhc.4489.
- Nannette Christ and Michael J. Ferrantino 2011. Land Transport for Export: The Effects of Cost, Time, and Uncertainty in Sub-Saharan Africa. *World Development* Vol. 39, No. 10, pp. 1749–1759. doi.org/10.1016/j.worlddev.2011.04.028
- Penthai S, Vincent N, 2020. Wildlife trade shifts from brick-and-mortar markets to virtual marketplaces: A case study of birds of prey trade in Thailand. *Journal of Asia-Pacific Biodiversity*, 500: 1-8. doi.org/10.1016/j.japb.2020.03.012
- Pervaze S, Katarina C, 2020. Wildlife Trade, COVID-19, and Other Zoonotic Diseases. *Congressional-Research Service (CRS). Rede Nacional de Combate ao Tráfico de Animais Silvestres (RENCTAS), 2001. 1 Relatório Nacional sobre o Tráfico de Fauna Silvestre. RENCTAS, Brasília.*
- Sajeva, M., Augugliaro, C., Smith, M.J., Oddo, E., 2013. Regulating internet trade in CITES species. *Conserv. Biol.* 27, 429e430. <https://doi.org/10.1111/cobi.12019>.
- Sami B, Anne B, Mathieu P, Gaël R, 2015. ALGERIA–MALI TRADE: THE NORMALITY OF INFORMALITY. *The Economic Research Forum.* 960. doi.org/10.1080/17938120.2017.1353767
- Sigrist, T., 2009. Guia de Campo AvisBrasilis – Avifauna Brasileira: Descrição das Espécies, 1ª. ed. Avisbrasilis, São Paulo.
- Sung YH, Fong J. 2018. Assessing consumer trends and illegal activity by monitoring the online wildlife trade. *Biological Conservation* 227:219e225. doi.org/10.1016/j.biocon.2018.09.025
- Sung YH, Fong J. 2018. Assessing consumer trends and illegal activity by monitoring the online wildlife trade. *Biological Conservation* 227:219e225. doi.org/10.1016/j.biocon.2018.09.025.
- Sung YH, Fong J. 2018. Assessing consumer trends and illegal activity by monitoring the online wildlife trade. *Biological Conservation* 227:219e225. <https://doi.org/10.1016/j.biocon.2018.09.025>
- The Wildlife Trade Monitoring Network (TRAFFIC), 2011. Wildlife Trade: What Is It? <<http://www.traffic.org/trade>> (accessed June 2011).
- Tingley MW, Harris BC, Hua F, *et al.* 2017. The pet trade's role in defaunation. *Science* 356:6341. [doi:10.1126/science.aan5158](https://doi.org/10.1126/science.aan5158).
- Walther, O. (2014), "Business, Brokers and Borders: The Structure of West African Trade Networks", [doi:10.1080/00220388.2015.1010152](https://doi.org/10.1080/00220388.2015.1010152)
- Weldon, C., du Preez, L.H., Hyatt, A.D., Muller, R., Speare, R., 2004. Origin of the amphibian chytrid fungus. *Emerg. Infect. Dis.* 10, 2100–2105. [doi:10.3201/eid1012.030804](https://doi.org/10.3201/eid1012.030804)

- WikiAves, 2011. A enciclopédia de aves do Brasil. <www.wikiaves.com.br> (accessed April 2011).
wild-bird trade modify invasion risks at a global scale. *Conservation Letters* 1–22. doi:[10.1111/conl.12361](https://doi.org/10.1111/conl.12361)
- Xinhua News. 2020. China launches crackdown on violations of wildlife trade ban. XinhuaNet. Available at: http://www.xinhuanet.com/english/2020-02/10/c_138771340.htm. (Accessed 1 March 2020).
- Yee J, Unger L, Zadravec F, *et al.* 2020. Novel coronavirus 2019 (COVID-19): Emergence and implications for emergency care. *Journal of the American College of Emergency Physicians Open*.<https://doi.org/10.1002/emp2.12034>.
- ZlatozarBoev 2018. Birds in everyday life and art in Bulgaria (Thracian and Roman periods). *Historia naturalisbulgarica* 27: 3–39.
- Brochet, A. L., Van den Bossche, W., Jbour, S., NDANG'ANG'A, P. K., Jones, V. R., Abdou, W. A. L. I., ... & Barbara, N. (2016). Preliminary assessment of the scope and scale of illegal killing and taking of birds in the Mediterranean. *Bird conservation International*, 26(01), 1-28. DOI:[10.1017/S0959270915000416](https://doi.org/10.1017/S0959270915000416)

