

# Harvesting trends of Amboina box turtles (*Cuora amboinensis*) seventeen years after listing in Appendix II CITES

MUHAMMAD ALIF FAUZI<sup>1</sup>, AMIR HAMIDY<sup>2</sup>, NIA KURNIAWAN<sup>1,✉</sup>

<sup>1</sup>Department of Biology, Faculty of Mathematics and Natural Sciences, Universitas Brawijaya. Jl. Veteran, Malang 65145, East Java, Indonesia.

Tel.: +62-341-554403, ✉email: wawan@ub.ac.id, wawanunibraw@gmail.com

<sup>2</sup>Museum Zoologicum Bogoriense, Research Center for Biology, Indonesian Institute of Sciences. Widyasatwaloka Building, Jl. Raya Jakarta Bogor Km 46, Cibinong, Bogor 16911, West Java, Indonesia

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**Abstract.** Fauzi MA, Hamidy A, Kurniawan N. 2020. Harvesting trends of Amboina box turtles (*Cuora amboinensis*) seventeen years after listing in Appendix II CITES. *Biodiversitas* 21: 1142-1148. Among Southeast Asian freshwater turtles, the Amboina box turtle (*Cuora amboinensis*) held the highest recorded harvesting levels. The large volumes of harvesting influenced its International Union for Conservation of Nature (IUCN) revised the conservation status of *C. amboinensis* from Near Threatened to Vulnerable in 2000. The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) also inclusion of Amboina box turtle in Appendix II category. The CITES trade database provided a data set that tracks the legal trade of *C. amboinensis* in the global market from 2000 to 2017. Before 2005, Malaysia was the largest major supplier of this species to the global market. However, after 2005, Indonesia replaces Malaysia as the biggest exporter. From 2005 to 2014, the data showed that the trade trends already followed the quota of provisions. The trade routes of *C. amboinensis* showed that the USA was the country to which these turtles were most frequently imported (50 times during 2000-2017), while China was still the biggest importer country in terms of quantity (463584 individuals from 2000-2017). The USA re-exported *C. amboinensis* for the pet trade to several European countries. Vietnam reportedly also re-exported *C. amboinensis* from Laos. However, Laos has rarely reported the occurrence of export activities to Vietnam. Based on these findings, we were able to understand the dynamics of the *C. amboinensis* trade globally more clearly, propose several actions deemed necessary for its conservation, and suggest greater on-going coordinated efforts to monitor the trade of this species.

**Keywords:** *Cuora amboinensis*, Indonesia, re-export, trade

## INTRODUCTION

Recently, the major threat of the biodiversity conservation is a wildlife trade (Nijman and Shepherd 2011). The increases in global market demand for turtles will affect to the decreasing populations of some species in the wild (Broad et al. 2003). The high demand for some species, especially as food for human consumption or traditional medicines leading to unsustainable harvesting levels (Winbaum et al. 2012). Turtles are one of the animal groups that are over-exploited for commercial purposes (Lovich et al. 2018). In early 2000, Vietnam and Bangladesh were the main supplier countries for the commercial turtle trade in the Asian countries. However, due to the declining populations of turtles in those areas, the main supplier countries of turtles changed to India, Myanmar, Laos, Cambodia, and Indonesia (Moll and Moll 2004; Noureen et al. 2012).

Turtle trade activities have been recorded in some detail since 1990. Shepherd (2000) surveyed in Sumatra and recorded 25 tons turtles exported every week to China, Hongkong and Singapore. Chen et al. (2000) also reported that, from 1992 to 1998, about 958 tons of turtle shells entered Taiwan, originating from China and other countries in Southeast Asia. In Hongkong, Kendrick and Ades (2009) found 10,000 whole plastrons originating from Java, Indonesia. Currently, the most threatened turtle is genus

*Cuora* (Turtle Conservation Coalition, 2018) with almost all species classified in Endangered and Critically Endangered according to IUCN (2019). Overexploitation of this species to fulfill the demand of the Chinese market for food ingredients of Traditional Chinese Medicine (TCM) caused the decrease of this population (Schoppe 2008). Furthermore, deforestation is also the other factor causing the declining population (Stokeld et al. 2014).

The Convention on the International Trade in Endangered Species of Wild Fauna and Flora (CITES) inclusion of all species on Genus *Cuora* in Appendix II (Schoppe 2008). However, approximately all of the species of *Cuora* have been proposed for uplisting to Appendix I (CITES, 2019; CoP18 Prop.36). At present, only *Cuora amboinensis* is legally traded and monitored by CITES. Robinson et al (2015) in international trade, *C. amboinensis* is the second of most traded animal from wild source code. This turtle is easy to recognize by a yellow line that extends to the upper head (Iskandar 2000, Figure 1). The species is distributed throughout Java, Sumatra, Borneo, Sulawesi, Ambon, Malaysia, Thailand, Cambodia, Vietnam, Bangladesh, Assam, Myanmar, and Philippines (Auliya 2007). This species is divided into four subspecies including *C. a. amboinensis*, *C. a. couro*, *C. a. kamaroma* and *C. a. lineata* (Rummler and Fritz, 1991; McCord and Philpenn, 1998)



**Figure 1.** *Cuora amboinensis* from Sumatra, Indonesia. Photographs by A. Hamidy

The CITES trade database is the main data source that provides data about the legal international animal trade at the species level. So far, no studies have investigated the global trade of *C. amboinensis* based on legal trade that reported to CITES by exporter and importer countries. Therefore, this study was aimed to analyze the trade trends of Amboina box turtles after this species was listed in Appendix II and reveal the trading partnerships globally. Furthermore, we hope that the result of this study will inform all parties of CITES and national government to compose better law as an effort to conserve the species.

## MATERIALS AND METHODS

### Data collection

We downloaded data of *C. amboinensis* from CITES Trade Database ([www.trade.cites.org](http://www.trade.cites.org)) for 2000-2017 period on February 14, 2019. The data was provided the information of number of traded species, source code, importing countries and exporting countries from 2000 to 2017 and presented in semicolon tabulation reports. Based on the CITES tabulation data, there were 273 incidents of *C. amboinensis* trading with the wild ('W') and Ranching ('R') source code. The data reported to CITES was based on individual export reports and accumulated into the annual data. All of the importing and exporting countries must report which species are being traded together with other related data, including purposes, and the origin of each species. Therefore, the trading data of all species can be monitored. CITES classifies the species that were traded (trade terms) into six categories (live, carapace, pets, bodies, skins, trophies, and derivatives). The sources were divided into 6 categories (captive (C), wild (W), Ranching (R), Unspecified (U), Seized (I), (Born in captivity (F), Preconvention (O) (CITES, 2017). The data obtained required a conversion to produce uniform data set models.

In the CITES database, there is an issue of the export of turtle carapaces. It can still be evaluated by converting the numbers of pieces being sold into numbers of the whole turtle. In the case of trade in other animals such as *Manis sp.*, there are also reports related to trade in the form of

meat, skin, and scale (Heinrich et al. 2016; Gomez et al. 2017). For meat conversion and scale on *Manis sp.* are a definite reference for converting to the whole pangolin. Further, in turtle, there has never been reported for the conversion of turtle carapace into the whole turtle of turtles trading. We tried to convert carapace by measuring the weight of carapace and a whole plastron on the four specimens of the Museum Zoologicum Bogoriense (MZB). The average weight of plastrons and carapace dry specimens used in this study was 239 g.

### Data analysis

We analyze only *C. amboinensis* with Wild (W) Source code (Luiselli et al. 2012; Luiselli et al. 2016). But, Ranching (R) source code also analyzed in the analysis because this code also caught from the wild. In this study, the origins of the species *C. amboinensis* were also traced from the trade data. Some countries re-exported *C. amboinensis* but the source code was not declared. To construct the international partnerships we used <https://trademapper.co.uk> with several modifications. We removed number of trade by each country and changed the proportions of import and export activity. We used CITES guidance to knowing country code of the trade partnerships. Importer and exporter reports will be combined with knowing partnerships of these trade. The normality and homogeneity test was performed in R-software (R Core Team, 2015) to check the data variables. A non-parametric test was used in this study to analyze the trend of pre and post-2005 according to the number of *C. amboinensis* trade.

## RESULTS AND DISCUSSION

### Results

The total specimens trade of *C. amboinensis* during seventeen years were 597520 individuals reported by the importer, 755495 individuals reported by exporters from 273 trading incidents. We also recorded: 21,190 kg of the carapace, 24 kg derivatives, 1 skin and 100 unspecified. We found a change in traded trends before and after 2005 showing significant results (importers reported  $p = 0.0001$ ; exporters reported  $p = 0.0007$ ). Although there are no differences in number specimens traded reports from importers and exporters, statistical results showed that the reports are not significantly ( $p = 0.37$ ). In the early 2000 to 2005, the amount of *C. amboinensis* traded was 398354 reported by importers (mean = 66392, min = 33193, max = 30075) and 458339 reported by exporters (mean = 76398, min = 30075, max = 274657). After 2005, the trend of this species showed a stable number with an average of 21776 per year (min = 17707, max = 49654). But, in 2012 and 2013 there was an increase in the trade of *C. amboinensis* at 42000 individuals. The following year returned stable with an average trade of 17488 individuals (Figure 2).

As we have described before, there is a different trend in *C. amboinensis* trade before and after 2005. It happened due to the export activity of Malaysia from 2000 to 2004 as the main supplier of *C. amboinensis* was changed. In early

2000, Malaysia exported more than 260,000 individuals but in the following year are declined and increasing in 2004. However, since 2005, Malaysia has never been reported again of exporting this species (Figure 3). Further, importer reported stated that 33969 individuals imported from Malaysia. On the other hand, Indonesia continuously exported *C. amboinensis* from 2000 to 2017 (mean = 16112). However, in 2014, Indonesia has exported 20000 kg of turtle's carapace to Taiwan. This amount was equal to 83682 of whole *C.amboinensis*. Besides, Vietnam export trend was reported to have a re-export activity of this turtle from Laos. Almost all the export activity (except 2003 and 2006), Vietnam has been re-exported turtles with R-source code from Laos (Figure 3).

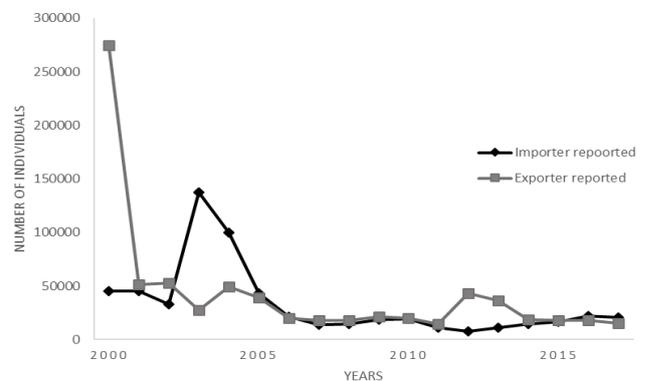
From a total of 273 export incidents of *C.amboinensis* trade for seventeen years, the highest incidents were obtained in 2004 (Figure 4). Further, after 2004, there is a fluctuation that tends to increase the incidents. Indonesia is the country with the most export activities. Further, Malaysia ranks first in the highest number of the export of *C.amboinensis*. For importer country, the highest number of *C.amboinensis* trade still belongs to China and Hongkong. In addition, that US and Japan become the most countries that imported this turtle every year (Figure 5).

Analysis of the trade routes of *C. amboinensis* showed interesting results. Six top countries contributed to the export network, with Indonesia being the most connected country in the trade (31 trading partners); followed by the US (16 trading partners), Malaysia (12 trading partners), Vietnam (5 trading partners), Laos (2 trading partners) (Figure 6). In the CITES Data, we found that the US becomes a transit country for re-exporter activities. The United States imported *C. amboinensis* 50 times from the wild and re-exported them 36 times. New findings that

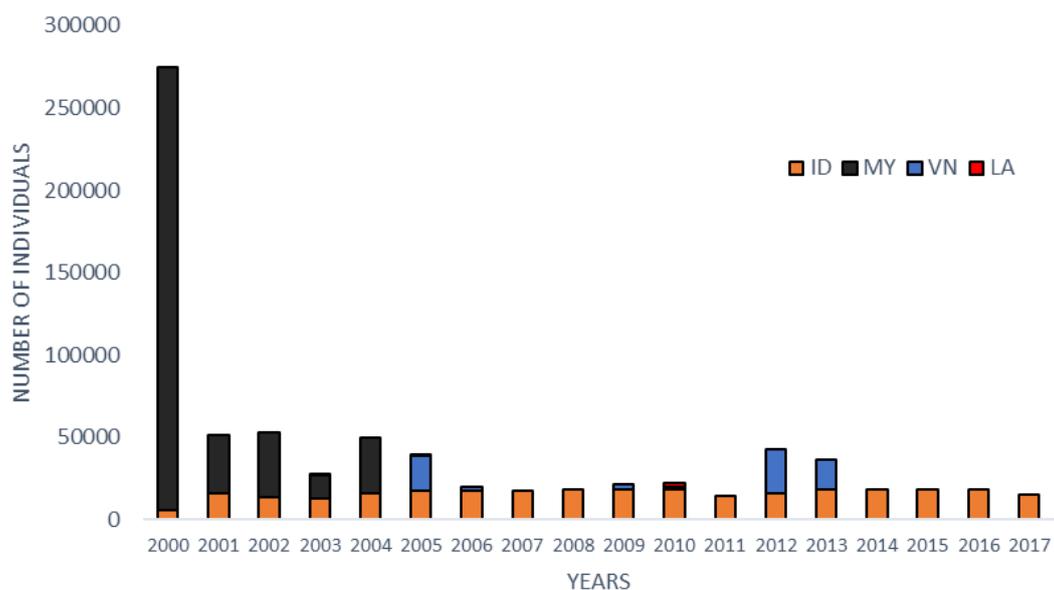
Vietnam also becomes a transit country for reexporting turtles from Laos and Myanmar. Vietnam was recorded 6 times exported turtle to China with 5 times re-exporting turtles from Laos, and one from Myanmar.

**Discussion**

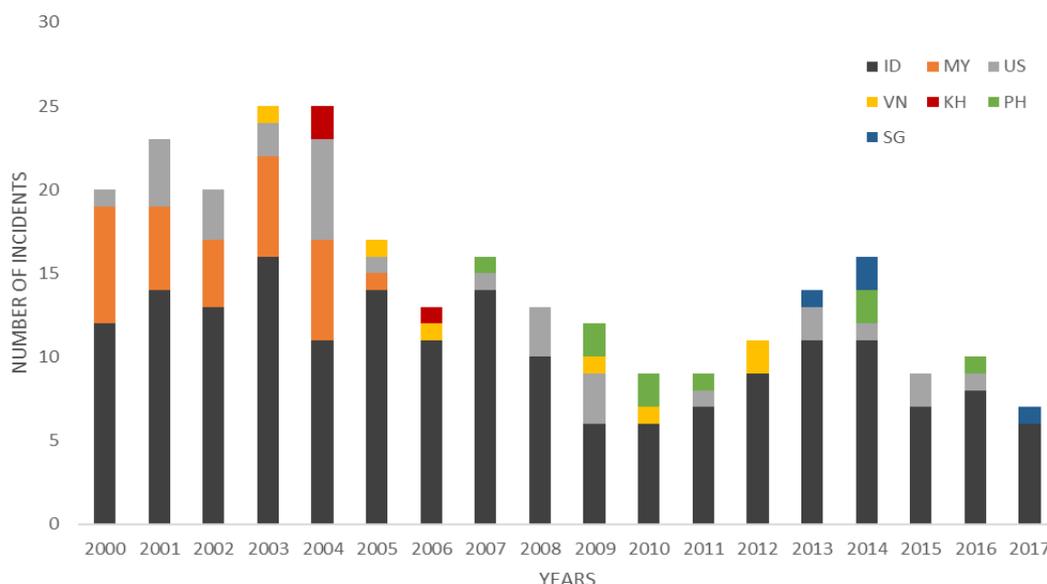
We provide the latest overview of the Ambon turtle trade globally based on comprehensive information. According to the overview, a fluctuating trend was found in this trade. This CITES data can characterize the legal trade of this species, although there are differences in data that occur from data reported by importers and exporters, as can be seen, that from the total amount of *C. amboinensis* declared by importers was 597,520 individuals, while by exporters was 755,495 individuals (a 11% difference) (Nijman and Shepherd 2011).



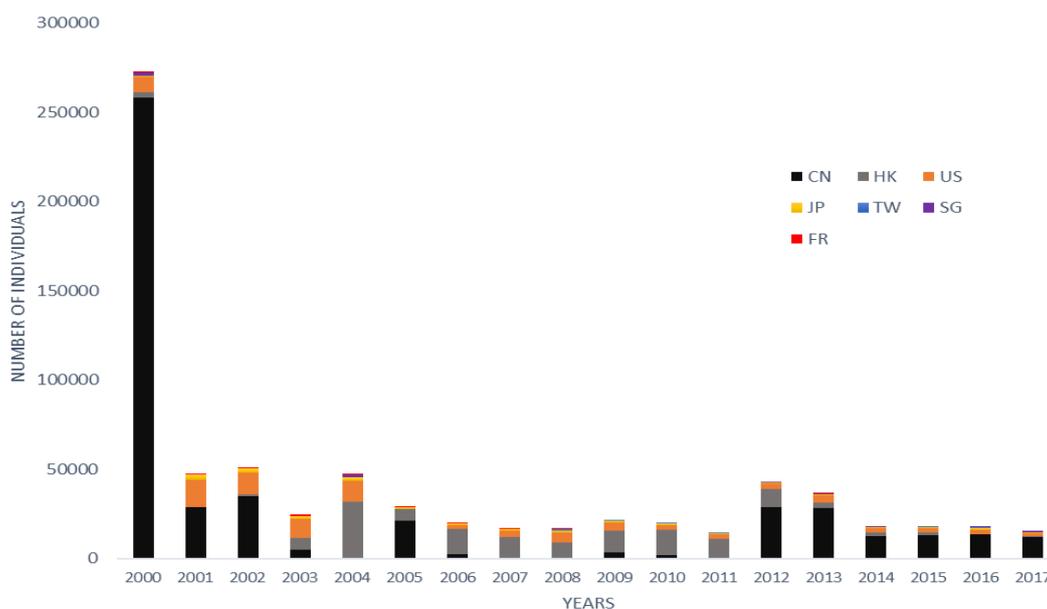
**Figure 2.** The global trends of *C. amboinensis* trade during seventeen years



**Figure 3.** Total number of exported by main exporter country for seventeen years. (Exporter reported). The country codes are as follows: ID: Indonesia, MY: Malaysia, VN: Vietnam, LA: Laos



**Figure 4.** Total number of incidents of *C. amboinensis* trade. The country codes are as follows: ID: Indonesia, MY: Malaysia, US: United States, VN: Vietnam, KH: Cambodia, PH: Phillippines, SG: Singapore



**Figure 5.** Total number of imported of *C. amboinensis* (Exporter reported). The country codes are as follows: CN: China, HK: Hongkong, US: United States, JP: Japan, TW: Taiwan, SG: Singapore, FR: France

This data difference can be caused by several things, for example, the time difference when the permit is issued and the number of specimens that are likely to die before being exported. The difference in the calculation between the number of permits issued and the actual number of individuals imported is probably the main cause for differences in data reported by exporters and importers. Another assumption is that there is an indication of illegal trade using false CITES permits (Rosen and Smith 2010). This information needs further investigation in responding to trade reports involving two countries. This was also suggested by Smith et al. (2011) to highlight and identify reporting or declaration differences.

The trend of Ambon turtles trade was fluctuated before and after 2005. This happened due to the fact that Malaysia banned this species of trade in 2005. However, the reason why Malaysia's ban this trade activity is still unclear (Schoppe 2008). Also, the regulation to ban that activity is still not effective in protecting the turtle. But as the positive side, it can stabilize the population of this turtle in ecosystem (Santos et al. 2001). This export ban must involve the readiness of the authorities in relation to monitoring the wildlife trade of each country. If this is not met, it will lead to the activity of illegal trading.



source code, animals was taken in stages juvenile or eggs and raised in controlled environment. However, the sources and the number of exported in large quantities with a Ranching source code are suspicious because of the growth of these turtles in captivity from hatchling/juvenile to adult size needs 4-5 years (Schoppe 2009). In case, when animals are declared using the 'R' source code, it takes a long time to reach a commercial size, and this may also be economically unviable. This condition needs further investigation because Laos has only been declared for exporting this turtle to Vietnam, whereas Vietnam has always claimed that the Ambon turtles exported came from Laos (a re-export from Myanmar was also recorded in 2006). However, in fact, the turtle trade in Vietnam was supplied from neighboring countries such as Laos and Cambodia (Pham- Van et al. 2014). It is still can not be confirmed the truth that Laos was Ranching the Ambon turtle, or they are just using the false source code. If Laos has the potential to harvest Ambon turtles, it is necessary to set quotas and establish non-detrimental findings for a trade involving animals that are listed in Appendix II according to Article IV CITES implementation. This difference in reporting activity can be evidence that there needs to increase in the awareness of the illegal trade channels of the two countries. We also advise the two countries to actually report factual data relating to this type of trading.

Based on these data, the wildlife trade of *C. amboinensis* needs special attention, especially from the importing and exporting countries. The wildlife trade can eventually have negative impacts on the economic and social activities of the community that are catching and selling the animals at source, and will also threaten the conservation of the species in the longer term (McNeill and Lichtenstein 2003; O'Brien et al. 2003). Therefore, the wildlife use must be more strictly managed by applying the principles of legality, traceability, and sustainability. The CITES parties of each government must cooperate to close the access to illegal trade, on the land, the sea and the air. Monitoring and reporting of the wildlife trade, especially of *C. amboinensis* and other species, should be carried out regularly and periodically by government wildlife conservation departments in cooperation with NGOs. This will help to anticipate and identify illegal trading activities. If there are indeed illegal indications, termination must be taken immediately. In addition, there needs to be greater cooperation between the CITES scientific and management Authorities (CITES MA and SA) of each country to conduct Non-Detrimental Findings (NDF) to determine sustainable harvesting quotas of this species. Local NGOs and researchers have a significant role to play in publicizing illegal trade and lobbying government departments to enforce the regulations.

Finally, there are interesting findings that indicate changes in routes and supplier countries that were trading in *C. amboinensis*. Wild populations of these species are predicted to decline due to over-exploitation. Also, the reproduction rate of this species is relatively slow, so that recovery of local population numbers will take some considerable time, even with adequate conservation measures in place. Thus, we recommend regular

monitoring of both legal and illegal trades, and they could be helped in this endeavor with greater cooperation of the authorities and traders to enforce applicable laws, and the issuance of research permits and funding that supports the necessary research. The regulations that govern and regulate the trade of turtle body parts, whole live and or dead animals must also be clarified and standardized so that neighboring countries can cooperate in trade monitoring more easily. Standardization of reporting must then be strictly implemented by each exporting country, importer country, and re-export country so that monitoring and enforcement are easier to implement. If the country concerned exports in the form of carapace, plastron or other body parts, then the source code and intended use must be clear. If the export quota has run out, then other forms of export must include an explanation related to the goods to be sold (eg, collection results for several years). Conservation efforts for *C. amboinensis* should be done by switching to captive breeding, so far as this effort is aimed at reducing or even stopping the trade of wild-caught animals. There should be financial incentives from the government to promote captive breeding if it is deemed necessary to continue the trade legally. Finally, the implementation of Article IV of CITES (principle of trade in Appendix II listed species) must also be carried out by the authorities of each country, so that credible science-based population data can be used as a reference for formulating realistic quotas (rather than only using trader hear-say) that can support a more sustainable wildlife trade.

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