

## Trade in nautilus and other large marine molluscs as ornaments and decorations in Bali, Indonesia

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**Abstract.** We surveyed jewellery, arts-and-crafts and tourist shops in eight towns in Bali, Indonesia, in July 2014, to assess trade in four species of large marine mollusc shells (chambered nautilus *Nautilus pompilius*, Triton's trumpet *Charonia tritonis*, horned helmet *Cassia cornuta*, and false trumpet *Syrinx aruanus*). Nautilus, Triton's trumpet and horned helmet are protected species and cannot be collected or traded legally, whereas commercial trade in false trumpet is subject to strict regulations. We found 465 large shells openly for sale in Kuta-Legian (4 shops), Denpasar (2 shops), Ubud (14 shops), Tampaksiring (5 shops), Nusa Dua (7 shops) and Sanur (9 shops). Trade in nautilus (264 shells, 27 shops, 6 towns), horned helmet (70 shells, 13 shops, 5 towns) and Triton's trumpet (25 shells, 10 shops, 4 towns) was as open as that of false trumpet (106 shells, 9 shops, 3 towns). Shops displayed protected species openly in shop windows and several large department stores carried them in substantial numbers. In Bali large marine molluscs do not receive proper protection from exploitation, despite legislation being in place. We conclude that this is largely due to a lack of enforcement and not because of the hidden nature of the trade.

**Key words.** CITES, Wildlife trade, Indonesia, Marine mollusc, Shell, Nautilus

### INTRODUCTION

Throughout the world, gastropods, cephalopods and bivalve shells are bought or collected as 'portable memories' when people are vacationing (Gossling et al., 2004; Gibbons & Remaneva, 2011), and marine mollusc shells continue to have an economic value as ornaments or decorations (Claassen, 1998; Gossling et al., 2004). Tropical shells, with their attractive colours and hues, and various morphologies with intricate spikes and curves, are especially popular souvenirs. The development of tourism in the tropics, both by visitors from abroad as well as domestic tourists, over the last decade has increased the market for souvenirs, with consequent pressures on marine resources (Dias et al., 2011).

Indonesia, the world's largest archipelago, is a popular tourist destination and according to the country's official statistical agency in 2013, some nine million international tourists visited the country. One of the more popular islands is Bali and indeed, approximately three million international and six million domestic tourists visit the island per year (Atmojo, 2012). In terms of wildlife trade Bali is known as a transit hub for trade in marine fish and corals (Bentley, 1998; Lunn & Moreau, 2004), as a consumer of marine turtles (Sudiana et al., 2009) and to a lesser extent, dugongs (Lee

& Nijman, 2015), and as a source area for certain songbirds and civets (Jepson, 2010; Nijman et al., 2014). Hitherto the role of Bali in the trade of marine mollusc shells has received little attention.

Indonesia is rich in marine molluscs, and several species have been, or still are, traded in large numbers (Whitten et al., 1994; Butcher, 2004; Nijman et al., 2015). Based on their slower life histories, the larger species in particular are expected to be more negatively affected by this trade (Gössling et al., 2004; Dias et al., 2011; Gibbons & Remaneva, 2011). We here consider the trade in four large species of marine mollusc, i.e. chambered nautilus *Nautilus pompilius*, Triton's trumpet *Charonia tritonis*, horned helmet *Cassia cornuta*, and false trumpet *Syrinx aruanus*, as these are amongst the largest marine molluscs of which the shells are traded for decorative purposes in Indonesia (Nijman et al., 2015). None of these species have yet been assessed against the IUCN Red List criteria (IUCN, 2016), for which data on characteristics including life histories and population distributions in addition to threats is essential but currently limited (Allcock, 2011; IUCN, 2014; Zhang et al., 2013). Concerns about the status of several species primarily due to over-exploitation have been expressed in the past (CITES, 1994; Gössling et al., 2004; Dias et al., 2011; Gibbons & Remaneva, 2011; DeAngelis, 2012). Three of the four species we focus on are protected from exploitation and for the fourth trade is heavily regulated; as such exploitation of these four species of marine molluscs should be less of a concern than in other parts of their range where protection or regulation is lacking. In Indonesia, chambered nautilus, Triton's trumpet and horned helmet have been legally protected since 1987 (SK MenHut No 12/

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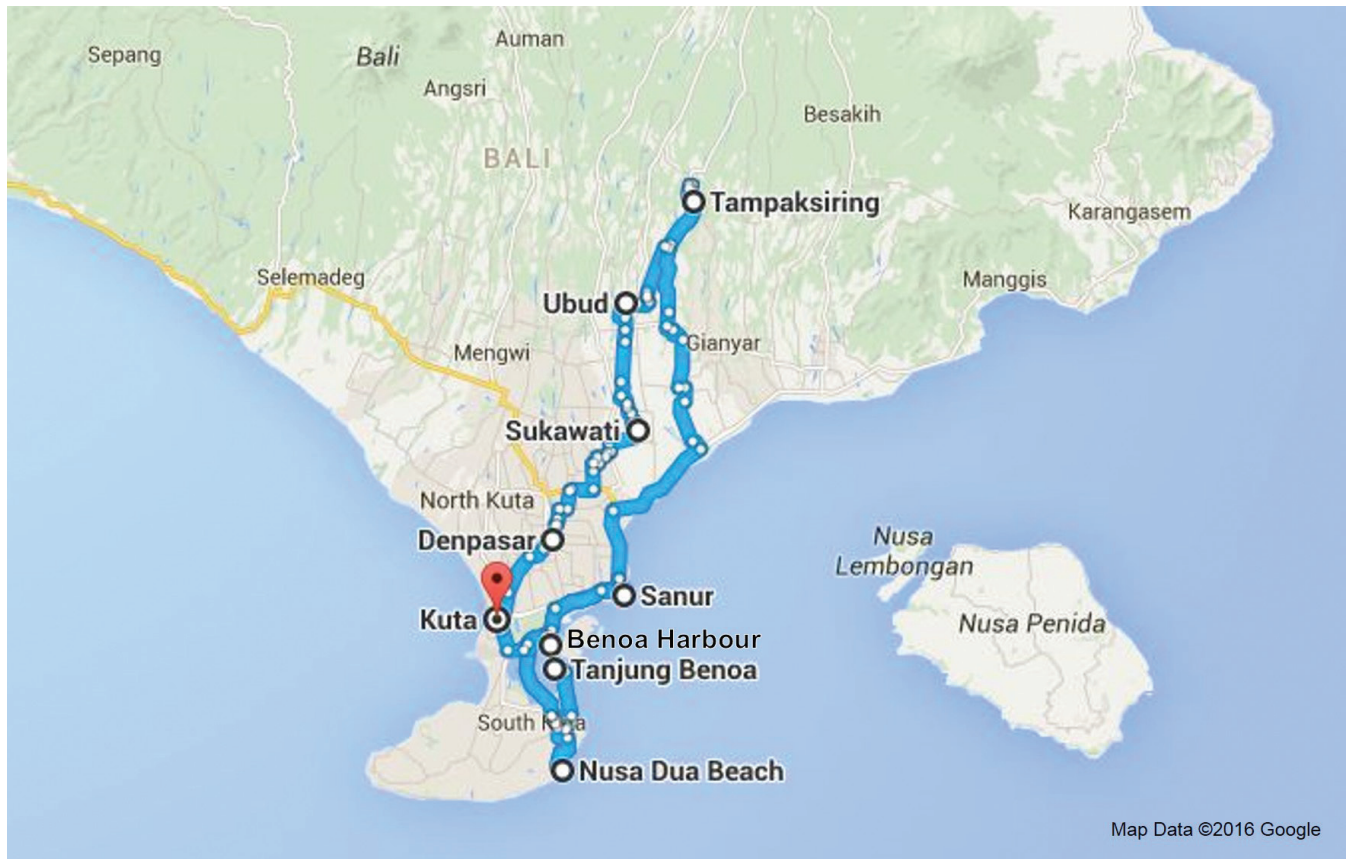


Fig. 1. Towns and routes surveyed for the trade in marine shells in Bali, Indonesia, in July 2014.

Kpts/II/1987, an annex on the establishment of additional protected wild animal species in addition to the wild animals species that already are protected) (Noerdjito & Maryanti, 2001). It is not allowed to collect protected species, to harvest them, or to sell or buy them. Fines for trading in protected species can total the equivalent of US\$8,500 and / or five years imprisonment. False trumpet is not included in the country's protected species list, but its commercial trade is subject to a quota system, similar to all other non-protected species (Nijman et al., 2015). Quotas are set annually with specific numbers allowed to be harvested from different provinces; however, to the best of our knowledge, no such quotas have ever been set for false trumpets, precluding the species to be traded in shops and markets. At the time of our survey in 2014 none of the four species we focus on were included in one of the appendices of the Convention on International Trade in Endangered Species of Fauna and Flora (CITES), which would regulate international trade (in 2016 all species of nautilus were included in Appendix II, regulating international trade). Given that no harvest or trade is permitted within Indonesia, legal exports should be non-existent.

It is important to note that shells are often seen as portable memories that are collected on the beach while vacationing, but the trade in chambered nautilus, Triton's trumpet, horned helmet and false trumpet is distinctly different. It is not economical for collectors or traders to patrol large stretches of beach for washed up shells—the majority of which would be damaged, bleached and of inferior quality,

thus lowering their economic value. Instead these shells are actively harvested when still alive—chambered nautilus by using baited catching crates and the other species are collected by (semi-)professional divers (Dunstan et al., 2010; Freitas et al., 2014; Nijman et al., 2015)—and subsequently transported over large distances via a network of traders and middlemen to reach consumer markets.

## METHODS

We visited Bali from 24 to 30 July 2014 and the survey period coincided with the Lebaran holiday (end of the Ramadan period, with many Indonesian Muslims returning to their home village). The majority of people living on Bali are Hindu, and while Lebaran resulted in some of the non-Balinese Muslim-owned shops being closed, this impact was overall considered of little significance for the aims of the present study. We selected survey areas on the basis of the following: 1. Known centres of wildlife trade (e.g. Tampaksiring, Benoa, Denpasar) (e.g., Sudiana et al., 2009; Nijman & Nekaris, 2014); 2. The presence of large numbers of tourists and tourist-orientated shops (e.g., Kuta, Ngurah Rai International Airport); 3. The presence of luxury hotels with associated shops and shopping centres (e.g., Nusa Dua, Sanur). Specifically, we surveyed the following towns and main roads (Jl = Jalan = Road or Street): Kuta-Legian on 24, 25 and 30 July (Jl Pantai, Jl Kartika Plaza, Jl Legian, Jl Raya Kuta and Ngurah Rai International Airport); Denpasar on 25 July (Satria bird market, Jl Hasanudin); Ubud on 26 and 27 July (Jl Wanara Wana, Jl Raya Ubud, Jl Hanuman);





Fig. 2. Large marine mollusc shells for sale in Bali, July 2014: A (i), (ii), (iii), and (iv) chambered nautilus *Nautilus pompilius*; B. Triton's trumpet *Charonia tritonis*; C. false trumpet *Syrinx aruanus*; D. horned helmet *Cassis cornuta*.

Table 1. Large marine mollusc shells observed for sale in Bali, July 2014.

| Towns         | Date       | Wildlife<br>Shops Visited | Shops with<br>Shells | Chambered<br>Nautilus | Horned<br>Helmet | Triton's<br>Trumpet | False<br>Trumpet |
|---------------|------------|---------------------------|----------------------|-----------------------|------------------|---------------------|------------------|
| Kuta-Legian   | 24, 25, 30 | 4                         | 4                    | 6                     | 1                | 0                   | 0                |
| Denpasar      | 25         | 36                        | 1                    | 1                     | 2                | 0                   | 0                |
| Sukawati      | 26         | 2                         | 0                    | 0                     | 0                | 0                   | 0                |
| Ubud          | 26, 27     | 39                        | 14                   | 116                   | 15               | 9                   | 67               |
| Tampaksiring  | 27         | 15                        | 8                    | 24                    | 9                | 13                  | 17               |
| Tanjung Benoa | 28         | 0                         | 0                    | 0                     | 0                | 0                   | 0                |
| Nusa Dua      | 28         | 16                        | 6                    | 80                    | 25               | 1                   | 22               |
| Sanur         | 29, 30     | 20                        | 8                    | 17                    | 18               | 2                   | 0                |
| Benoa Harbour | 30         | 0                         | 0                    | 0                     | 0                | 0                   | 0                |
| Total         |            | 132                       | 41                   | 264                   | 70               | 25                  | 106              |

Sukawati on 26 July (Pasar Seni); Tampaksiring on 27 July; Tanjung Benoa and Benoa harbour on 28 and 30 July; Nusa Dua on 28 July (Nusa Dua Galleria shopping centre and the grounds of luxury hotels); and Sanur on 29 and 30 July (Jl Danau Tambelingan) (Fig. 1). We visited all shops potentially selling ornamental shells, including jewellery stores, department stores, arts and crafts shops, tourist shops, and wildlife shops, and counted the number of shells for each. Different from other parts of Indonesia where we have conducted wildlife trade surveys, especially in the shops in luxury hotels and shopping centres, shells had price tags or price stickers attached to them, either in Indonesian Rupiah or US dollar. These were duly recorded. Alternatively, prices were requested (in Indonesian Rupiah as we expect US dollar prices to be inherently inflated) from vendors. For analysis all prices were converted to US dollars using a July 2014 exchange rate of 11,500 Rupiah to the dollar. All surveys were conducted by us, a male Caucasian and a female of Chinese descent: while we may have stood out as 'different' in many parts of Indonesia, in Bali we fitted in with the general tourist population. Conversations with vendors were normally conducted in Bahasa Indonesia, or alternatively, when initiated by the vendor, in English or Chinese. No wildlife was purchased.

## RESULTS

We did not find any large marine mollusc shells for sale in Sukawati, Tanjung Benoa or Benoa harbour, but they were for sale everywhere else (Fig. 2). In total we found 465 large shells for sale, in 41 shops (Table 1). About a third of the shells were worked into vessels with silver casings, carved, and, to a lesser extent, painted or modelled into craftwork. The others were sold unworked. They were all displayed in the open (including in shop windows); none were hidden from view, and without exception vendors and dealers were open in providing information or showing their wares. Trade in the three protected species did not differ qualitatively from that in the non-protected false trumpet.

The most common species on offer was the chambered nautilus with 264 shells in 27 shops in six towns. Next came

the false trumpet, with 106 shells in nine shops in three towns, followed by the horned helmet (70 shells, 14 shops, six towns) and Triton's trumpet (25 shells, 10 shops, four towns). The total number of shells of protected species on offer was 359 in 31 shops in six towns.

The largest number of shells offered for sale was in Ubud, where 14 shops displayed 116 nautilus shells, mostly in the form of vessels with silver casings, 15 horned helmets (eight with silver casings), nine Triton's trumpets and 67 false trumpets. Most shops offered small numbers of shells, but one silver shop specialising in offering large shells worked into silver vessels displayed 83 nautilus shells, eight Triton's trumpets, five horned helmets and five false trumpets, and another shop offered 62 false trumpets. Tampaksiring was distinct in the wide variety it offered; the five shops there displayed 24 nautilus, nine horned helmets, 13 Triton's trumpets and 17 false trumpets. The eight shops in Sanur selling marine mollusc shells had a total of 17 nautilus, 18 horned helmets and two Triton's trumpet on display. Relatively small numbers were on offer in the very touristy Kuta-Legian area (a mere four shops, offering six nautilus shells and one horned helmet shell), but the equally busy Nusa Dua Galleria shopping centre stood out with two department stores carrying 19 nautilus, five horned helmet and two false trumpet shells, and 41 nautilus and one Triton's trumpet shell, respectively. Another shop in Nusa Dua displayed 20 shells each of nautilus, horned helmet and false trumpet in its window.

Prices varied extensively, even for similar items, and depended very much on the type of retailer offering it. Unworked shells typically were offered for Rp 250,000–300,000 / US\$22–26 (horned helmet), Rp 350,000–500,000 / US\$30–43 (nautilus, Triton's trumpet) and Rp 500,000–1,000,000 / US\$43–89 (false trumpet); the price of worked shells depended largely on the amount and quality of the silverwork. Especially in the high-end shops, but also in two department stores in Nusa Dua, shells had price stickers, mostly in Indonesian Rupiah but sometimes in US dollars. Elsewhere prices had to be requested from the traders or shop assistants. In some of the more specialised shops, in for instance Ubud, the traders had



Table 2. Seizures of protected marine molluscs in Bali in the period 2005–2015 as reported by Indonesian media and responsible government agencies.

| Town               | Date              | Chambered Nautilus | Horned Helmet | Triton's Trumpet | Reference       |
|--------------------|-------------------|--------------------|---------------|------------------|-----------------|
| Tanah Lot          | 29 August 2005    | 1                  | 9             | 45               | CITES, 2005     |
| Denpasar           | 2 December 2005   | 10                 | 8             | 5                | CITES, 2005     |
| Denpasar           | 14 February 2006  |                    | 75            |                  | CITES, 2005     |
| Kuta               | 17 February 2006  | 22                 | 14            | 11               | CITES, 2005     |
| Legian             | 7 May 2008        | 20                 |               |                  | Istanto, 2009   |
| Denpasar           | 10 July 2008      | 1                  |               | 1                | Istanto, 2009   |
| Kuta               | 27 August 2008    | 5                  | 8             | 5                | Istanto, 2009   |
| Badung             | 2 September 2008  |                    | 5             |                  | Istanto, 2009   |
| Ngurah Rai Airport | 23 September 2008 | 213                |               | 16               | Wisnu, 2009     |
| Tanjung Benoa      | 15 May 2009       | 15                 |               |                  | Istanto, 2010   |
| Ngurah Rai Airport | 25 September 2009 | 200                |               |                  | Anonymous, 2009 |

extensive knowledge about their shells and its trade, but in many more general shops, including those on the grounds of luxury hotels and in shopping centres, the sales persons had limited information on any aspect of the trade. In the former shops we feel deals could be made when purchasing shells, especially when larger numbers were involved, but in the latter prices were fixed. We were not in a position to bargain as that would imply an intention to buy, and may have stimulated trade. As such prices between shops are not comparable.

## DISCUSSION

We observed close to 400 shells of legally protected species displayed openly for sale in Bali's busiest tourist areas. In almost every town we surveyed there were shops offering these species, and especially in Ubud and Nusa Dua several shops offered large quantities or specialised in selling marine mollusc shells. Nusa Dua, and to a lesser extent Ubud, cater for the high-end tourism market, with Ubud presenting itself as a cultural and artistic centre and Nusa Dua being a purpose-built and gated tourist enclave (known as a Kawasan Pariwisata, lit. tourism district or region) with primarily luxurious 5-star resorts. It was somewhat surprising to see such large quantities of protected wildlife for sale at these sites and we suspect that many of the potential customers here are unaware of the legal status of the shells on offer. Ubud and Tampaksiring geographically stand out from the other towns as they were located more inland. We suspect that it is the crafts and carving centre of Tampaksiring where a large proportion of the carving and etching of shells is done; the same may be true for the town of Sukawati, despite us not finding shells on display during our survey.

The trade is nothing but open and targets, apart from domestic visitors, international tourists presumably unaware of Indonesia's domestic protected species legislation. In 2013 TRAFFIC, the wildlife trade monitoring network, commissioned an investigation into the trade of the nautilus, with market surveys conducted in East Asia and Southeast Asia, including in Indonesia. No other protected marine mollusc shells were investigated during this survey. Of

the 226 shops that were surveyed in Bali, 24 sold whole chambered nautilus shells (worked and unworked): in Nusa Dua, Kuta, Sanur, Tampaksiring, Ubud, Gianyar and Denpasar (Freitas et al., 2014). We are not aware of any other similar surveys that have been conducted on Bali, but our results are comparable to those presented by Nijman et al. (2015) who surveyed the beach resorts of Pasir Putih and Pangandaran on Java, where all four species were openly offered for sale. Combined the data from these three studies show that the trade in these protected marine mollusc shells is similar in the different parts of western Indonesia, with larger numbers being traded openly despite their legal protection.

It is unclear where the marine molluscs offered for sale in Bali originate from, and hence what the effect of collection has on local marine ecosystems, but it seems that at least some of them are collected offshore in Bali whereas others are collected elsewhere in Indonesian waters. Some species occur mostly on sandy bottoms, in intertidal and sublittoral zones, to a depth of about 30 m (false trumpet), while others occur further away from the coast and down to at least 300 m (chambered nautilus), and yet others are found on coral reefs (Triton's trumpet) (CITES, 1994; Carpenter & Niem, 1998; Freitas et al., 2014). While chambered nautilus, Triton's trumpet and horned helmet occur in both to the east and west of Bali, as well as in the seas surrounding Bali, false trumpet must have been collected in and transported from eastern Indonesia (distribution maps in Carpenter & Niem (1998) show the species to be confined to the seas north of Australia and eastern Indonesia). Freitas et al. (2014) showed that most, if not all, chambered nautilus in trade in Bali originate from eastern Indonesia, and Nijman et al. (2015) showed that many of the horned helmets in trade in Java and Bali originate from Sulawesi, an island to the north of Bali.

Nijman et al. (2015) gave an overview of 20 seizures made of protected marine mollusc shells in western Indonesia, five of which referred to Bali. Interestingly, the Bali Natural Resource Management Agency, responsible for enforcing protected species legislation, has in the past made several seizures, but these are few and far between, and we were not able to find any reported seizures after September 2009 (Table

1). Most seizures concern small to intermediate numbers and are from towns included in our survey. The largest seizures refer to two attempts to export protected marine mollusc shells via the Ngurah Rai International Airport. The results of our and TRAFFIC's surveys made it clear that these seizures have not worked as a deterrent for the continued trade in these protected species. The open, illegal sale and consistent presence of protected species in Bali's major tourism areas points at a clear neglect of duties of the Indonesian wildlife conservation authorities and suggest a lack of pressure on the authorities to treat these illegal sales as a priority issue. Shop owners selling protected marine molluscs must be held accountable for their actions. Given the widespread availability and the large number of shops and traders involved it would be prudent if the Balinese Natural Resource Management Agency, perhaps aided by other government and non-governmental agencies, embark on a focussed awareness campaign informing traders about the protected status of selected marine species and illegality of their actions, followed by targeted seizures and prosecutions.

### ACKNOWLEDGEMENTS

We thank Made Kesuma and Ida Bagus for logistics, Kanitha Krishnasamy for information on nautilus trade surveys, TRAFFIC and Wildlife Reserves Singapore for funding, and two reviewers for helpful comments and suggestions.

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