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**Addressing the open illegal trade in large marine mollusc shells in Pangandaran,
Indonesia**

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Abstract

Several species of large marine molluscs are formally protected in Indonesia and cannot be
15 traded commercially. We address the trade in these species in the coastal resort of Pangandaran,
West Java, Indonesia, based on five visits between January 2013 and August 2016. Traders
openly displayed species such as horned helmet *Cassis cornuta* (364 shells in 31 shops; 2015
prices of US\$14/shell), chambered nautilus *Nautilus pompilius* (173 shells, 23 shops;
US\$14/shell) and Triton's trumpet *Charonia tritonis* (76 shells, 10 shops; US\$51/shell) during
20 each visit. The largest number of shells per shop was 40 (January 2013) and 16 (December
2015), but most shopkeepers offered smaller numbers. Prices for individual shells remained
relatively stable over the three-year survey period, and the average retail value was US\$150
(January 2013) to US\$100 (December 2015) per shop, due to a diminished number of shells
offered by individual shops. To curb the trade in these protected species we recommend that
25 three points need to be addressed: firstly, the level of monitoring allowing real time reporting of
violations must be increased; secondly, law enforcement in Pangandaran and appropriate
prosecution of law breakers needs to be initiated; and thirdly, additional legislation and
regulations for selected species may need to be introduced.

30 **Ringkasan**

Beberapa jenis moluska laut secara resmi dilindungi di Indonesia dan jenis-jenis ini tidak boleh diperdagangkan secara komersial. Kami mengatasi perdagangan jenis-jenis ini di resor pantai Pangandaran, Jawa Barat, Indonesia, didasarkan pada empat survai di antara Januari 2013 dan Agustus 2016. Spesies seperti kerang kepala kambing *Cassis cornuta* (364 kerang di 31 toko; 35 harganya Rp 194.000 / kerang di tahun 2015), cukli *Nautilus pompilius* (173 kerang, 23 toko; Rp 196.000 / kerang) dan terompet triton *Charonia tritonis* (76 kerang, 10 toko; Rp 713.000 / kerang) secara terbuka ditampilkan oleh para pedagang selama setiap survai. Jumlah kerang per toko yang terbesar adalah 40 (Januari 2013) dan 16 (Desember 2015). Harga kerang tetap relatif stabil selama periode survei, dan nilai per toko adalah rata-ratanya Rp 1,4 juta (Januari 2013) 40 atau Rp 1,5 juta (Desember 2015) per toko; sejumlah berkurang dari kerang yang ditawarkan oleh toko-toko individu. Untuk menghentikan perdagangan spesies ini dilindungi kami sarankan berikut ini. Pertama, pemantauan perlu ditingkatkan, memungkinkan real melaporkan pelanggaran waktu. Kedua, penegakan hukum di Pangandaran perlu memulai benar. Ketiga, undang-undang dan peraturan untuk jenis terancam perlu ditingkatkan..

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Keywords: CITES, conservation, giant clam, nautilus, wildlife trade

Introduction

Trade in marine mollusc shells in Indonesia is strictly regulated for most of the smaller species 50 and is largely prohibited for the larger species (Whitten et al., 1996). Despite this, ample evidence for a substantial domestic and international illegal trade exists in especially the more valuable species (Nijman et al., 2015a). Recent seizure data give some indications of the magnitude of this trade. On 15 August 2015 a container with 15,725 horned helmet *Cassis cornuta* shells, 1,300 of what are most likely prickly pen shells *Pinna muricata*, and 1,670 kg of tiger cowrie *Cypraea tigris* 55 was confiscated in the harbor of Indonesia's capital city Jakarta on the island of Java (Tarmizi, 2015). Three years before, on 19 June 2012, two containers with 485 chambered nautilus

Nautilus pompilius, 20,515 horned helmet, 204 Triton's trumpet *Charonia tritonis*, and 768 false trumpet *Syrinx aruanus* shells, as well as 2,849 kg of noble volutes *Cymbiola nobilis*, were confiscated in the harbor of Surabaya, Indonesia's second largest city, also on Java (Anonymous
60 2012). According to the customs department, the 2015 seizure had a value of ~US\$1.4 million and the 2013 seizure a value of ~US\$1.1 million; both shipments were destined for China (Tarmizi, 2015; Anonymous, 2012).

Whereas the illegal international trade in marine molluscs in and out of Indonesia occasionally makes headlines in Indonesia and, more rarely, abroad, especially when large
65 seizures are involved, the domestic trade in these species hitherto has gone largely unnoticed. The legislation that underpins the protection of species like horned helmet, chambered nautilus and Triton's trumpet is identical to that of conservation icons such as orangutans *Pongo* spp, tigers *Panthera tigris*, or Indonesia's national bird the Javan hawk-eagle *Nisaetus bartelsi*. Penalties that can be imposed on those trading in protected marine molluscs are the same as for
70 the aforementioned species (i.e. US\$ 7,100 at 2016 exchange rates, and up to five years imprisonment). But whereas the trade in orangutans, tigers and Javan hawk-eagles has become increasingly less open in recent years (Nijman et al., 2009, 2015b; Ng and Nemora, 2007), the trade in protected marine molluscs is as open now as it has ever been. The popular tourist destination of Pangandaran on Java's south coast is a case in point as protected shells are
75 offered openly for sale by a relatively large number of traders. Between 2013 and 2015, we visited Pangandaran five times and made a comprehensive assessment of its trade in large, protected mollusc shells. We present our findings to increase knowledge and awareness of the trade in these species, to point at deficiencies in current legislation, and to advocate for better regulation and enforcement of existing legislation.

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Methods

1. Study area and study species

Pangandaran (7°41' S, 108°39' E) is the village namesake of the in 2012 created Pangandaran Regency of West Java. Declared by the government as one of the country's 'National Tourism

85 Sites' (*Andalan Wisata Nasional*), the Pangandaran District (*kecamatan*) has a population of just
over 50,000 that is boosted annually by over 2 million, largely domestic, visitors. To enter the
Pangandaran peninsula visitors are required to purchase an entry ticket (US\$0.25 per visitor plus
US\$1.42-4.02 for private vehicles, the amount depending on the size of the car), and visitors can
stay in one of an increasingly large number of hotels. Weekends are more popular than
90 weekdays and many additional (smaller) outlets are open on weekends. Large marine shells are
sold in general tourist shops, in curio shops that have worked shells into handicrafts, and, to a
lesser extent, by wholesalers that also cater to the general public. We focused on five taxa, viz.
chambered nautilus, horned helmet, Triton's trumpet, false trumpet and giant clams *Tridacna* spp.
All have been protected since 1987 (*Surat Keputusan Menteri Kehutanan No 12/Kpts/II/1987*),
95 apart from the false trumpet, which is not included on Indonesia's protected species list. However,
its trade is regulated through a quota system and to the best of our knowledge, no quota has ever
been allocated to the species, thus making all commercial trade as observed in Pangandaran,
illegal.

100 **2. Data acquisition**

We visited Pangandaran on 5-6 January 2013 (VN), 8-10 June 2013 (VN), 18-19 June 2014 (DS),
19-20 December 2015 (VN, KAIN) and 20-21 August 2016 (VN, MS). Apart from the 2014 survey,
all surveys were conducted over weekends when between 200 and 300 stalls and shops selling
wildlife products were open (during the week typically half the shops are closed). The entire
105 Pangandaran area was surveyed twice during each survey as to assure no shops were missed or
to include shops that were closed on the first survey day. For all species whole individuals were
counted, but for giant clams, vendors often offer halves for sale, and these were counted as one.
When vendors displayed complete giant clams we also counted these as one. Large shells were
mostly offered as whole unworked specimens: a small number may have been included in
110 mosaics or other handicrafts, including giant clam shells into jewellery boxes, but these were not
included in the assessment. Vendors were interviewed, in Bahasa Indonesia, about origins,
prices, and monetary values. Prices are based on 'first quotes' and would have gone down with

bargaining or when more than one shell would have been purchased at a time. One vendor indicated that the first quotes as presented here could go down some 20% when negotiating the final purchasing price, and often vendors would give unsolicited second quotes some 10-15% below the first quote. Prices are presented in Indonesian Rupiah and US dollar; the exchange rate ranged from ~9,900 (January 2013), ~13,100 (August 2016) to ~13,800 (December 2015) Rupiah to the US dollar. The trade was open and there was no need to resort to undercover techniques, and no wildlife was purchased.

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3. Analysis

Prices of marine mollusc shells typically increase as one moves further up the trade chain (see Discussion); we used quotes from Pangandaran to arrive at an estimate of the gross retail value of the marine mollusc shells in trade. For some, but not all, species there is a clear relationship between price and size. When we had information on shell size we used this to estimate values; when these were not available we used average values as observed in Pangandaran.

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Results

1. Volume and species composition

Trade in large protected marine mollusc shells was open and various species were offered throughout various parts of the village, including the western and eastern beachfront and the tourism market at the northern end. Because of their large size they were often prominently displayed, clear for all to see, and it seems that at least in a number of shops they were used as features to lure prospective buyers into shops.

Horned helmet was the species offered in the largest numbers, and during the five visits over 300 specimens were observed (Table 1). Horned helmet ranged in size from 14 to 23 cm, with a peak in the 20-24 cm size class (Figure 1). On average between four and six horned helmet shells were offered per shop. Occasionally shops offered single horned helmets for sale, but others had up to 21 shells on display. In total we found 31 shops offering the species for sale.

The second most common species in Pangandaran was the chambered nautilus of which we

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observed almost 200 specimens, with on average between two and five shells per shop.

Chambered nautilus ranged in size from 14 to 22 cm, with most of the specimens in the 20-24 cm size class. Over 50 Triton's trumpets were observed making it the least common large marine mollusc shell on offer. Triton's trumpets were larger than the two aforementioned species and
145 ranged between 28 and 41 cm with the majority in the 30-34 cm and 35-39 cm size classes.

Insert Figure 1 here

Insert Table 1 here

150 **2. Prices and monetary value**

Prices differed greatly between species and somewhat between years. The most expensive shells were those of Triton's trumpet and false trumpet, i.e. between US\$35-50 for the former and between US\$27-63 for the latter. Asking prices in Indonesian Rupiah for Triton's trumpet almost doubled between early 2013 and late 2015 but the numbers observed in trade were similar and it
155 is not clear why prices changes so much. Conversely, asking prices in Indonesian Rupiah of false trumpet halved between the two periods. This is probably because of the presence of smaller individuals in 2015, as the asking prices in Indonesian Rupiah for large specimens remained similar (i.e. 500 and 700 kRp in 2013 and 600 kRp in 2015). Prices of chambered nautilus and horned helmet remained relatively constant, i.e. around US\$17 in 2013 and around US\$14 in
160 2015, especially when considering asking prices in Indonesian Rupiah (Table 2). Combined the value of the large marine molluscs in Pangandaran, based on asking prices, is in the order of US\$5,000 (January 2013) and US\$3,000 (June 2013, December 2015). In June 2014, when during weekdays about half the shops were closed, the value was still in the order of US\$2,000.

The monetary value of shells for individual shops was relatively small, and for all shops
165 shells comprised only a small proportion of their wares on offer. For instance, in January 2013 there were a total of 33 shops selling marine shells, and the average value based on asking prices was ~US\$150 per outlet. This average value is heavily skewed because of some shops, especially in the tourism market part of town, offering large numbers. The largest number of

shells offered by one shop was 40 (ten chambered nautilus, 15 horned helmet, four Triton's trumpet and 11 false trumpet) for a total value of ~US\$1,250. In December 2015, there were 27 shops selling shells, with an average retail value of ~US\$100. This was more equitably distributed amongst shops as the one with the largest number of shells on display was only 1 (one chambered nautilus, five horned helmet, seven Triton's trumpet and three false trumpet) for a total value of ~US\$550.

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Insert Table 2 here

Discussion

1. Topology of the trade

180 We observed almost 750 individuals of legally protected species during five 2 or 3-day surveys of the village of Pangandaran. In addition, we observed dozens of specimens of false trumpet, a species that likewise should not be traded commercially. The trade we observed in protected species was qualitatively not different from that in non-protected species; that is, all were displayed openly and asking prices were, according to vendors, not influenced by the species' protected status. From our visits it is clear that Pangandaran caters largely, if not almost exclusively, for Indonesian tourists and consumers and only to a very small degree for an international clientele. The shells are mostly derived from the seas to the east of Pangandaran, i.e. the Java Sea near East Java, Madura and Bali, or further east in the seas of the Lesser Sunda Islands (Nijman et al., 2015a). Middlemen transport the shells from the more eastern parts of Indonesia to Pangandaran and offer them to individual sellers in Pangandaran as well as to wholesalers. As such Pangandaran act as an important node in the trade in marine products in Java (see also Anonymous, 2005).

195 The value of the shells on offer at Pangandaran at any given time is relatively small, i.e. between US\$3,000-5,000, or between US\$100-150 per shop. These values are based on asking prices in Pangandaran – the prices that collectors or middlemen receive are considerably lower. For instance, Anonymous (2009a) reports that horned helmet shells are purchased from local

fishermen in North Sulawesi and the island of Banggai for US\$0.25-0.50 each. Prices are similar in Madura, where horned helmet and Triton's trumpet can be purchased for US\$0.40 and US\$1.00 and sold on to middlemen for US\$0.60 and US\$1.80, respectively (Anonymous, 2011).

200 The monetary values of seized shipments as assessed by the Indonesian customs agency, mentioned in the Introduction (Anonymous, 2012; Tarmizi, 2015), are based on considerably higher values of individual shells than we found in Pangandaran. The monetary value attached to the 2015 seizure suggests a retail price of ~US\$70-80 for horned helmet, and the 2012 seizure suggests retail prices of ~US\$40-60 for horned helmet and chambered nautilus. These
205 evaluations are three to six times higher than the asking prices in Pangandaran.

2. Legality of the trade

The trade in marine shells as observed in Pangandaran is in part comparable to that reported from Bali (Nijman and Nekaris, 2014; Nijman and Lee, submitted), the Philippines (Salamanca
210 and Pajaro, 1996; Floren, 2003), northeast Brazil (Dias et al., 2011) or Zanzibar (Gössling et al., 2004), although the openness of the trade in legally protected species is somewhat unique to Indonesia. This trade is clearly illegal under Indonesian law. Four of the five taxa we focused on are included on the country's protected species list and while false trumpet are not on this list, trade in them is only allowed following a quota system and no quota for the species have been
215 allocated. It is clear that implementation of these rules is far from perfect. Legally protected species are displayed openly; neither the local government that operates these facilities, nor officers from the regional Natural Resource Management Office, officers from the forestry department, nor the police seem to enforce wildlife protection legislation at these sites. However, how the various actors involved in the trade see this may differ. As Peluso (1992: 14), in her case
220 referring to the 'illegal' harvest of timber in Indonesia noted, "...what the state defines as criminal often differs substantially from the peasant definition of crime...". To a certain extent this may be the case as well for individual traders in Pangandaran, who purchase small amounts of protected marine molluscs from middlemen at a time, and sell them openly without penance. It may also apply to individual buyers, lured in by what is on display and ignorant of wildlife protection laws.

225 But it almost certainly does not, and certainly should not, apply to the middlemen, wholesale
exporters, officers employed by the regional governments operating this beach resort, or indeed
law enforcement officers. It appears that certainly in Indonesia curbing the large-scale trade in
marine molluscs is not on the radar of the enforcement agencies, and as such the distinction
between illegal, illicit and licit is blurred. While a number of confiscations have been made
230 involving 1000s or even 10,000s of shells from wholesalers or exporters (see Introduction and
Nijman et al., 2015a) trade in popular tourist resorts such as Pangandaran (this study), Pasir
Putih (Nijman et al., 2015a) and southern Bali (Nijman and Lee, submitted) remains open as ever.
Efforts made by the authorities to implement protected species laws are to be commended, but it
is clear that focusing on the individual collectors, smaller traders, or buyers, does not curb the
235 trade.

3. Recommendations for improved monitoring, legislation and enforcement

The observations in Pangandaran confirm there is an open and ongoing trade in legally protected
species of marine molluscs. Our results suggest scope for enhancement of protection of marine
240 molluscs in Indonesia.

Monitoring of the wildlife trade in Pangandaran is done infrequently at best, and has focused
strongly on marine turtles (Hilterman and Govertse, 2005; Anonymous, 2005; Nijman, 2015) and,
to a lesser extent, fisheries (Nikijuluw, 1989; Nugraha, 2012). The range of wildlife on offer at
245 Pangandaran includes a wide range of taxa from marine molluscs, coral, and crustaceans to fish,
reptiles and mammals. The potential for proper long-term monitoring is high as several major
universities and conservation NGOs in Jakarta, Bogor, Bandung and Yogyakarta and the
Indonesian Institute of Sciences and the Ministry of Fisheries in Jakarta, are all within a 6 to 7
hours drive from Pangandaran. It would be very productive if one of the many local (Javan)
250 conservation NGOs were to 'adopt' Pangandaran as one of their focus areas, ideally as part of a
close partnership between them and local and national government bodies. By doing so they can
act as the eyes and ears on the ground and serve as advocates for imperiled wildlife. A continued

or sustained presence means any violations or breaches of rules or regulations can be swiftly (or even in real time) be reported to the authorities as well as other interested parties including the media. We hope that the resulting pressure can act as a force for good when it comes to protecting and preserving Indonesia's rich biodiversity.

Collectors, middlemen, traders and consumers (both domestic and international) engaged in illegal activities in Pangandaran must be held accountable for their actions and prosecuted, and law enforcers must be given incentives to carry out their duties in this regard with greater efficiency. We agree with Tritto and Sözer (2014: p12) that "To date, the Indonesian conservation authorities continue to struggle with mainstreaming conservation related policies and enforcing relevant laws. The occasional raids on bird markets constitute merely inadequate authoritative signals that usually do not have any deterring effect [on] illegal bird poaching and other illegal wildlife trade in the country." The primary responsibility for ensuring protected species legislation is enforced lies with the BKSDA and the PHKA, which fall under the Ministry of Forestry. After our visits to Pangandaran in 2013 and 2015 we have written to Dr Novianto Bambang Wawandono, the Director of Biodiversity Conservation of the Ministry of Forestry, but apart from confirmation of receipt and the comment that he would check up on our findings, we have not received any indication that indeed action has been taken. In the context of Pangandaran, the local government agencies under the newly created Pangandaran Regency that operate at Pangandaran should take equal responsibility. We have not been able to find any report of wildlife, be it marine molluscs or other protected species, which have been confiscated in Pangandaran, despite their presence for decades (Nijman, 2014).

While there has been a lack of implementation of legislation in Pangandaran, as quoted in the Introduction, occasionally large shipments of protected shells are seized elsewhere in Indonesia. At times these seizures include large quantities of false trumpet (Anonymous, 2012), and for both protected and unprotected species there is sufficient regulation in place to prosecute traders or exporters that either trade in protected species or above and beyond established quotas for

unprotected species. False trumpet are not formally protected in Indonesia despite being the
extant largest gastropod with a slow life history and a restricted distribution in the Indo-Pacific.
Moreover, the numbers of false trumpet observed in trade and its perceived rarity in trade (as
attested by the high price at which the species is advertised) clearly indicate a greater need for
285 legal protection and as such there is room for improved legislation by including the species on
Indonesia's protected species list (Noerdjito and Maryanto, 2001). The availability of false
trumpets in the wholesale market suggests that international trade could indeed pose a threat to
its survival. Inclusion on the protected species list in itself may not lead to increased protection.
However, it may act as an initial step towards limiting over-exploitation.

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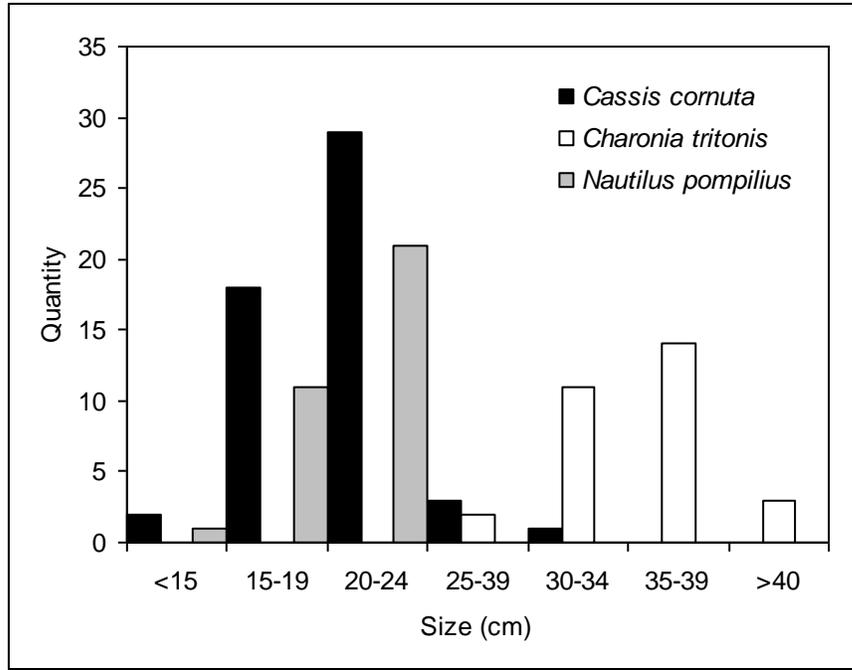
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Biography:

Vincent Nijman started has worked in Indonesia since the early 1990s and first visited Pangandaran in 1997. Subsequently he has made numerous visits to the peninsula both to the study the mammals and birds in the strict nature reserve and to study the trade in wildlife in the town. Between studying wildlife management and conservation biology in Leeds (BSc) and Oxford (MSc) and finalizing her PhD on Mexican spider monkeys, Denise Spaan was Field Station Coordinator for The Little Fireface Project, in Cipaganti, West Java. Marie Sigaud researched bison in Canada for her PhD and now is The Little Fireface Project's research coordinator, based in Cipaganti. Anna Nekaris is the Director of The Little Fireface Project, which aims at saving slow lorises (and other neglected but imperilled species) via ecology, education, and empowerment; tackling the threats posed by the illegal and unregulated trade in wildlife in Indonesia is one of the project's priorities.

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Figure 1. Distribution of sizes of three commonly traded marine molluscs in Pangandaran, Indonesia (from Nijman et al., 2015a). Sample sizes are n=53 for horned helmet *Cassis cornuta*, n=30 for Triton's trumpet *Charonia tritonis* and n=33 for chambered nautilus *Nautilus pompilius*.



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Table 1. Trade in large marine shells at Pangandaran beach resort, Java, Indonesia. Presented are the total numbers of shells for sale (number of shops where the species was offered for sale between brackets) and maximum number of shells on offer per shop.

Species (English / Indonesian, Latin)	5-6 January 2013	8-10 June 2013	18-19 June 2014	19-20 December 2015	20-21 August 2016	Total
Chambered nautilus / cukli <i>Nautilus pompilius</i>	56 (12) 10	42 (12) 8	16 (4) 9	24 (19) 5	34 (16) 7	173 (23) 10
Horned helmet / kepala kambing <i>Cassis cornuta</i>	111 (20) 21	89 (23) 17	39 (10) 11	73 (17) 11	52 (21) 8	364 (31) 21
Triton's trumpet / terumpet triton <i>Charonia tritonis</i>	15 (5) 6	17 (7) 4	4 (2) 3	16 (4) 7	24 (8) 4	76 (10) 7
False trumpet / terumpet <i>Syrinx aruanus</i>	27 (4) 11	11 (3) 4	12 (3) 9	19 (9) 7	16 (6) 4	85 (10) 11
Giant clam / kima <i>Tridacna spp</i>	25 (12) 4	39 (20) 6	10 (3) 6	20 (7) 6	33 (9) 7	129 (22) 7

370 **Table 2.** Prices (mean \pm 1 standard deviation) of large marine molluscs in Pangandaran in 2013 and 2015. Prices are given firstly in kRp and secondly in US\$ using an exchange rate of 10,000 (2013) and 14,000 (2015) rupiah to the dollar. Sample sizes are given between brackets.

Species (English / Indonesian, Latin)	5-6 January 2013	19-20 December 2015
Chambered nautilus / cukli <i>Nautilus pompilius</i>	169 \pm 68 / 16.94 \pm 6.82 (n=9).	196 \pm 27 / 14.02 \pm 1.92 (n=4)
Horned helmet / kepala kambing <i>Cassia cornuta</i>	169 \pm 48 / 16.92 \pm 4.80 (n=13)	194 \pm 66 / 13.89 \pm 4.80 (n=9)
Triton's trumpet / terumpet triton <i>Charonia tritonis</i>	350 \pm 94 / 35.00 \pm 9.35 (n=9)	713 \pm 284 / 50.89 \pm 20.28 (n=4)
False trumpet / terumpet <i>Syrinx aruanus</i>	633 \pm 12 / 63.33 \pm 11.55 (n=3)	383 \pm 202 / 27.38 \pm 14.43 (n=3)