

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

Vincent Nijman¹, Denise Spaan^{1,2}, Marie Sigaud¹ and K. Anne-Isola Nekaris¹

¹Oxford Wildlife Trade Research Group, Oxford Brookes University, Oxford UK

²Institute for Neuroethology, University of Veracruz, Xalapa, Mexico

Corresponding author: Vincent Nijman, Email: vnijman@brookes.ac.uk

ABSTRACT

Several species of large marine molluscs are formally protected in Indonesia and cannot be 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 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 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.

Abstrak

Beberapa jenis moluska laut secara resmi dilindungi di Indonesia dan tidak boleh diperdagangkan secara komersial. Kami mengamati perdagangan jenis-jenis ini di resor pantai Pangandaran, Jawa Barat, Indonesia, didasarkan pada lima kunjungan antara Januari 2013 dan Agustus 2016. Pada setiap kunjungan teramati bahwa pedagang secara terbuka memajang spesies kerang, seperti kerang kepala kambing *Cassis cornuta* (364 kerang di 31 toko; harganya di tahun 2015 US\$14/ kerang), cukli *Nautilus pompilius* (173 kerang, 23 toko; US\$14/ kerang) dan terompet triton *Charonia tritonis* (76 kerang, 10 toko; US\$51/ kerang). Jumlah kerang per toko yang terbesar adalah 40 (Januari 2013) dan 16 (Desember 2015), namun kebanyakan toko menawarkan dalam jumlah yang lebih sedikit. Harga masing-masing kerang relatif stabil selama tiga tahun periode survei, dan nilai per toko rata-ratanya adalah US\$150 (Januari 2013) sampai US\$100 (Desember 2015) per toko; karena berkurangnya jumlah kerang yang ditawarkan oleh masing-masing toko. Untuk menghentikan perdagangan spesies yang dilindungi ini, kami menyarankan tiga hal berikut ini; pertama, tingkat pemantauan perlu ditingkatkan sehingga memungkinkan pelaporan secara langsung terhadap adanya pelanggaran, kedua, penegakan hukum di Pangandaran dan hukuman yang setimpal bagi pelanggar hukum, dan yang ketiga perundangan dan peraturan tambahan perlu diterapkan untuk jenis-jenis tertentu.

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 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* was confiscated in the harbour of Jakarta on the island of Java (Tarmizi, 2015). Three years earlier, 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 harbour of Surabaya, Indonesia's second largest city, also on Java (Anonymous 2012).

Received 5th April, 2016; Revision received and accepted 4th September, 2016.

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 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 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, where protected shells are offered openly for sale by a large number of traders. Between 2013 and 2015, we visited Pangandaran five times and made an assessment of the 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.

METHODS

Study area and study species

Pangandaran (7°41' S, 108°39' E) is a village in Pangandaran Regency of West Java. Declared by the government as one of the country's 'National Tourism Sites' (Andalan Wisata Nasional), the Pangandaran District has a population of just over 50,000. Annually, it receives 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 the large number of hotels. Weekends are more popular than weekdays and many additional outlets are open on

weekends. Large marine shells are sold in 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), 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.

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 200-300 stalls and shops sell wildlife products. The entire Pangandaran area was surveyed twice during each survey to assure all shops countered, including shops that were closed on the first survey day. For all species, whole individuals were counted, however; vendors often offer half giant clams 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 mosaics or other handicrafts, including giant clam shells, but these were not included in the assessment. Vendors were interviewed in Bahasa Indonesia, about the origin, price, and monetary value. Price are based on 'first quotes' although bargaining is possible, particularly when more than one shell is purchased. One vendor indicated that the price could be bargained 20% below the opening offer, and often vendors also give unsolicited second quotes 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 without any need for undercover techniques, and no wildlife was purchased.

Analysis

Prices of marine mollusc shells typically increase the further up the supply chain one trades; we used quotes from Pangandaran to estimate the gross retail value of

the marine mollusc shells in trade. For some 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.

RESULTS

Volume and species composition

Trade in large protected marine mollusc shells was open and a range of species were offered throughout various parts of the village, including the western and eastern beach front and the tourism market at the northern end. Because of their large size they were often prominently displayed, presumably to lure prospective buyers into shops.

Horned helmet was offered in the largest numbers and over 300 specimens were observed during five visits (Tab.1). Horned helmets on sale ranged in size from 14 to 23 cm, with a peak in the 20-24 cm size category (Fig.1). On average between four and six horned helmet shells were offered per shop. Occasionally, some shops offered single horned helmets for sale, whereas others displayed up to 21 shells. In total 31 shops offered the species for sale. The second most common species on sale in Pangandaran was the chambered nautilus. Almost 200 specimens recorded, averaging 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 category. Over 75 Triton's trumpets were observed, making it the least common large marine mollusc shell on offer. Triton's trumpets for sale ranged between 28

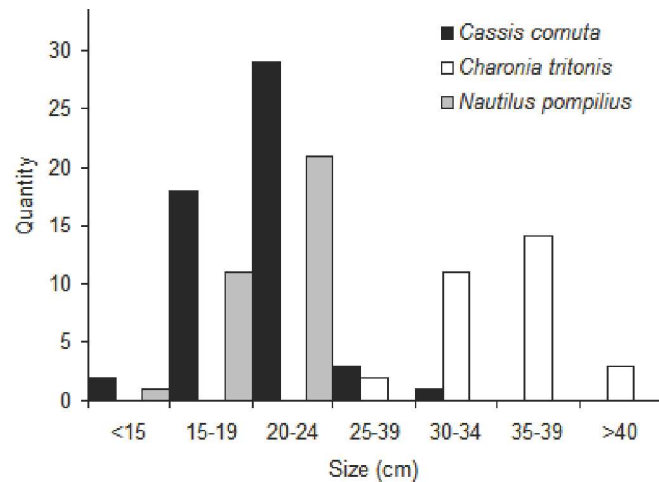


Figure 1. Sizes of three commonly traded marine molluscs in Pangandaran, Indonesia (from Nijman et al., 2015a). Horned helmet *Cassis cornuta* (n=53), Triton's trumpet *Charonia tritonis* (n=30) and chambered nautilus *Nautilus pompilius* (n=33).

cm and 41 cm with the majority in the 30-34 cm and 35-39 cm size categories.

Prices and monetary value

Prices differed greatly between species and, to a lesser extent, between years. The most expensive shells were Triton's trumpet and false trumpet fetching US\$35-50 and US\$27-63, respectively. Prices for Triton's trumpet almost doubled between early 2013 and late 2015, despite similar trading volumes. In contrast, false trumpet prices halved in the same period. Prices of chambered nautilus and horned helmet remained constant at approx. US\$17 in 2013 and US\$14 in 2015 (Tab. 2). The combined value of the large marine molluscs in

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

Species (English / Indonesian) <i>Latin</i>	5-6 January 2013	8-10 June 2013	18-19 June 2014	19-20 Dec. 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

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>Cassis 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)

Pangandaran, based on asking prices, reaches approx. US\$5,000 (January, 2013) and US\$3,000 (June, 2013, December 2015). In June 2014, half the shops were closed during weekdays, but the value remained high at approx. US\$2,000.

Shells comprised only a small proportion of products on sale in shops and the monetary earnings for individual shops selling shells was relatively small. In January 2013, a total of 33 shops sold marine shells with an average value, based on asking prices, of ~US\$150 per outlet. This value is biased by shops in the tourism market selling much larger 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) with 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 had a total value of ~US\$550.

DISCUSSION

Topology of the trade

We observed almost 750 individuals of legally protected species during five 2- and 3-day surveys of Pangandaran village. We also observed dozens of specimens of false trumpet, a species that should not be traded commercially. The trade in numbers of protected species was similar to non-protected species, and all species were displayed openly. In addition, the vendors claimed that sales prices were not dependent of the species' protection status. Our study demonstrates that Pangandaran caters almost exclusively for Indonesian tourists and consumers and only to a very small degree for international clients. The shells are mostly derived from the sea east of Pangandaran, i.e. East Java, Madura and Bali, or further east at the Lesser Sunda Islands

(Nijman et al., 2015a). Middlemen transport the shells to Pangandaran, where they are offered to individual sellers and wholesalers. As such, Pangandaran act as an important trading hub for marine products in Java (see also Anonymous, 2005).

The total value of the shells on offer at Pangandaran at any given time remains small (US\$3,000-5,000) and each vendor may earn US\$100-150 per shop from selling shells. These values are based on asking prices in Pangandaran, whereas the prices that collectors or middlemen receive are considerably lower. It is reported that horned helmet shells are purchased from local fishermen in North Sulawesi and the island of Banggai for US\$0.25-0.50 each (Anonymous, 2009a). 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). The monetary values of seized shipments by the Indonesian customs agency are based on considerably higher values of individual shells than we found in Pangandaran (Anonymous, 2012; Tarmizi, 2015). 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 evaluations are three to six times higher than the asking prices in Pangandaran.

Legality of the trade

The trade in marine shells in Pangandaran is comparable to the trade on Bali (Nijman and Nekaris, 2014; Nijman and Lee, in press), the Philippines (Salamanca and Pajaro, 1996; Floren, 2003), northeast Brazil (Dias et al., 2011) or Zanzibar (Gössling et al., 2004), although the openness of the trade in protected species is unique to Indonesia. This trade is clearly illegal under the Indonesian law. Four of the five taxa recorded are on the national list of protected species and, while false trumpet is not on this list, trading them is restricted to

a quota system. To date, no quota for the species have been issued.

It is evident that law enforcement is weak when protected species are displayed and sold openly. No officers from the regional Natural Resource Management Office, officers from the forestry department or the police were observed to enforce wildlife protection laws at the study sites. The various actors in the trade may perceive this form of “illegal” trading differently. In a case concerning illegal logging in Indonesia, Peluso (1992: 14) noted, “...what the state defines as *criminal* often differs substantially from the peasant definition of crime...”. The individual traders in Pangandaran perceives it in this manner too. They purchase small amounts of protected marine molluscs from middlemen, and sell them openly without any legal ramifications. It also applies to individual buyers, lured by displayed items and unaware of national wildlife protection laws. It almost certainly does 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 curbing the large-scale trade in marine molluscs is not a priority of Indonesia’s enforcement agencies and the distinction between illegal, illicit and licit is ambiguous. Some confiscations have taken place, involving 10,000s of shells from wholesalers and exporters (Nijman et al., 2015a), but trade at popular tourist resorts, such as Pangandaran (this study), Pasir Putih (Nijman et al., 2015a) and southern Bali (Nijman and Lee, in press) continue to prosper. Efforts made by the authorities to enforce relevant laws are commendable, but focusing only on individual collectors, smaller traders and buyers neither restrains nor reduces the trade.

Recommendations for improved monitoring, legislation and enforcement

The observations in Pangandaran confirm there is an open and flourishing trade in protected species of marine molluscs. We suggest a number of interventions to improve the protection of marine molluscs in Indonesia.

A) The range of wildlife on offer at Pangandaran includes marine molluscs, corals, crustaceans, fish, reptiles and mammals. However, monitoring of wildlife trade in Pangandaran is infrequent and focuses primarily on marine turtles (Hilterman and Govertse, 2005; Anonymous, 2005; Nijman, 2015) and, to a lesser extent, fisheries (Nikijuluw, 1989; Nugraha, 2012). 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). This is partly due to resource limitations within the authorities responsible for monitoring illegal/legal activities and law enforcement. Despite shortage of resources, effective long-term monitoring can be undertaken, if the local authorities are supported by one of the many local (Javanese) conservation NGOs. 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 within a 6 to 7 hours drive from Pangandaran. If some of these ‘adopt’ Pangandaran as one of their focal areas and work in close collaboration with the local and national government bodies, there will be adequate eyes and ears on the ground to serve as advocates for imperilled wildlife. A sustained presence means any illegal trade can be reported to the authorities immediately, as well as other interested parties including the media. The added vigilance may result in a positive effect in protecting and preserving Indonesia’s rich biodiversity.

B) Tritto and Sözer (2014) stated that “To date, the Indonesian conservation authorities continue to struggle with main-streaming 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.” Our study concurs with this statement, and the primary responsibility for relevant law enforcement is the BKSDA and the PHKA, under the Ministry of Forestry. Domestic and international collectors, middlemen, traders and consumers engaging in illegal activities in Pangandaran must be held accountable for their actions and prosecuted and, in this regard, law enforcers must be given incentives to carry out their duties with greater efficiency.

C) While there has been a lack of law enforcement in Pangandaran, large shipments of protected shells are occasionally 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 trade in protected species or above and beyond established quotas for unprotected species. Despite being the largest extant gastropod with a slow life history and a restricted distribution in the Indo-Pacific, false trumpets

are not formally protected in Indonesia. Moreover, the numbers of false trumpet observed in trade combined with its rarity in trade indicate a greater need for legal protection. Therefore, it ought to be included in Indonesia's protected species list (Noerdjito and Maryanto, 2001). The availability of false trumpets in the wholesale market suggests that over-harvest to supply international trade demand could drive it to local extinction, and while inclusion on the protected species list in itself will not lead to increased protection *per se*, it may act as an initial step towards limiting over-exploitation.

ACKNOWLEDGEMENTS

We thank RISTEK for permission to conduct the market surveys (11/TKPIPA/FRP/SM/XI/2013; 039/SIP/FRP/SM/II/2012 and 221/SIP/FRP/E5/Dit.KI/VII/2016). Columbus Zoo, Cleveland Metroparks Zoo, Leverhulme Trust (RPG-084), Mohamed Bin Zayed Species Conservation Fund (12254023) provided funding.

REFERENCES

- Anonymous (2005) Laporan investigasi perdagangan penyu di pesisir selatan Jawa. ProFauna, Malang.
- Anonymous (2012) Bea cukai Surabaya amankan 2 kontainer cangkang kerang / Cangkang kerang bernilai miliaran Rupiah. Surabaya Tribune, 19 June 2012. <http://www.tribunnews.com>
- Dias, T.L., Neto, N.A.L. and R.R. Alves (2011). Molluscs in the marine curio and souvenir trade in NE Brazil: species composition and implications for their conservation and management. *Biodiversity and Conservation* **20**: 2393-2405.
- Floren, A.S. (2003). The Philippine shell industry with special focus on Mactan, Cebu. Coastal Resource Management Project of the Department of Environment and Natural Resources, Manilla.
- Gössling, S., Kunkel, T., Schumacher, K. and M. Zilger (2004). Use of molluscs, fish, and other marine taxa by tourism in Zanzibar, Tanzania. *Biodiversity and Conservation* **13**: 2623-2639.
- Hilterman, M., and Goverse, E. (2005). A note on the illegal trade in stuffed turtles in South Java, Indonesia. *Marine Turtle Newsletter* **109**: 9
- Ng, J. and Nemora (2007). Tiger trade revisited in Sumatra, Indonesia. TRAFFIC Southeast Asia, Petaling Jaya, Malaysia
- Nijman, V. (2015). Decades-long open trade in protected marine turtles along Java's south coast. *Marine Turtle Newsletter* **144**: 10-13.
- Nijman, V., Shepherd, C.R., and S. van Balen (2009). Declaration of the Javan hawk eagle *Spizaetus bartelsi* as Indonesia's National Rare Animal impedes conservation of the species. *Oryx* **43**: 122-128.
- Nijman, V. and Nekaris, K.A.I. (2014). Medicinal and curio trade in Bali, Indonesia. *TRAFFIC Bulletin* **26**: 31-36.
- Nijman, V. and Lee, P. (in press). Trade in nautilus and other large marine molluscs as ornaments and decorations in Bali, Indonesia. *Raffles Bulletin of Zoology*.
- Nijman, V., Spaan, D. and K.A.I. Nekaris (2015a) Large-scale trade in legally protected marine mollusc shells from Java and Bali, Indonesia. *PLoS One* **10(12)**: e0140593.
- Nijman, V., Spaan, D., Rode-Margono, E.J., and K.A.I. Nekaris (2015). Changes in the primate trade in Indonesian wildlife markets over a 25-year period: Fewer apes and langurs, more macaques and slow lorises. *American Journal of Primatology*: 10.1002/ajp.22517
- Nikijuluw, V.P.H. (1989). Impact of trawl abolishment on fish production and fish price at Pangandaran. *Jurnal Penelitian Perikanan Laut (Indonesia)* **51**: 101-106.
- Noerjito, M. and Maryanti, I. (2001). Jenis-jenis hayati yang dilindungi perundang-undang Indonesia. LIPI, Cibinong.
- Nugraha A (2012). Pengaruh keberadaan pangkalan perdaratan ikan Pangandaran terhadap kondisi sosial dan ekonomi masyarakat sekitarnya. BSc thesis, Institut Pertanian Bogor, Bogor.

Peluso, N. (1992). Rich forests, poor people: Resource control and resistance in Java. University of California Press, Berkeley

Salamanca, A. M., and Pajaro, M. G. (1996). The utilization of seashells in the Philippines. *TRAFFIC Bulletin* **16**: 61-72.

Tarmizi, T. (2015) Bea Cukai akan usut ekspor satwa ilegal. Antara News 12 August 2015. <http://www.antaranews.com/berita/512019/bea-cukai-akan-usut-ekspor-satwa-ilegal>

Tritto, A., and Sözer, R. (2014). Bird thieves in Java show that Indonesian wildlife crime knows no boundaries. *Journal of Indonesia Natural History* **2**: 11-12.

Whitten, T., Soeriaatmadja, R. E. and Afiff, S. A. (1996) The ecology of Java and Bali. Periplus Editions, Singapore.