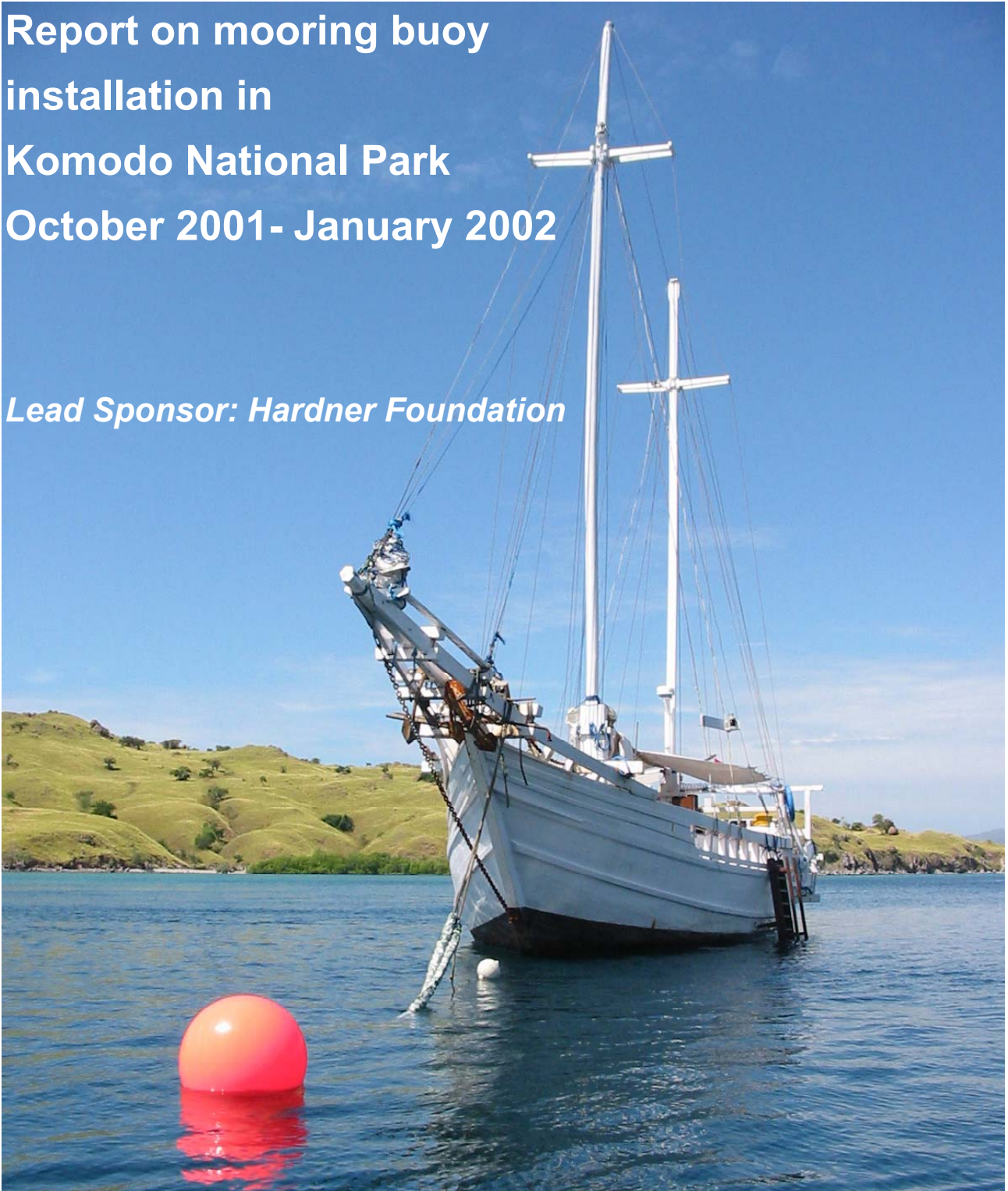


Report on mooring buoy installation in Komodo National Park October 2001- January 2002

Lead Sponsor: Hardner Foundation



**Report from The Nature Conservancy, Coastal and Marine Program Indonesia
in collaboration with the Komodo National Park authority, June 2002.**

Compiled by:
Dr. Peter J. Mous, Head of Conservation Science
TNC Southeast Asia Center for Marine Protected Areas
JI Pengembak 2, Sanur, Bali, INDONESIA
phone +62-(0)361-287272, fax +62-(0)361-270737



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Introduction: Mooring buoys as a tool to prevent anchoring damage to coral reefs

Komodo National Park (Indonesia, Fig. 1) is widely recognized as an exceptional storehouse of both terrestrial and marine biodiversity with global significance. Because of its unique biodiversity and its scenic beauty, Komodo today is one of the most visited nature reserves in Indonesia in spite of its remoteness. There was a rapid increase in park visitors during the 1990s, peaking at 32,000 in 1996. While political and economic instability in the region have reduced the visitors to two-thirds of that peak, there is no doubt that Komodo will remain an important tourism destination, especially for diving and snorkeling. In 2001, the number of dive operators based in Labuan Bajo, the basis for most day trips to Komodo, more than doubled from 2 to 5 dive operators.



Figure 1. Map of Indonesia with location of Komodo National Park.

Increased tourism is both an opportunity and a threat to the marine biodiversity of the Park. Through a system of Park entry fees, dive tourists contribute to the financing of Park. However, increased dive tourism also means that there will be more vessels looking for a place to anchor in the Park. Uncontrolled anchoring by these vessels may seriously damage the Park's marine habitats. This threat can be abated by the



Figure 2. Mooring buoys that were installed in Komodo National Park in 1996 and 1997.

deployment of mooring buoys near the dive sites, in combination with a regulation that prohibits dive vessels to anchor on the reefs. Mooring buoy regulations are already implemented in other marine protected areas, for example in Bonaire Marine Park (Caribbean). The need for mooring buoys to prevent anchoring damage to corals was also highlighted during the TNC / PADI-AWARE workshop on sustainable marine tourism¹. One of the leading dive associations in the world, PADI, even organizes seminars specifically on mooring buoy program planning.

¹ Mous P.J. 2001 (Ed). Report Workshop on Sustainable Marine Tourism in Komodo National Park. Grand Bali Beach Hotel, Sanur, Bali, Indonesia. February 28-March 2, 2001. Organized and hosted by The Nature Conservancy, Coastal and Marine Program - Indonesia in collaboration with PADI-AWARE. 31 p

Since 1996, The Nature Conservancy's Indonesia Coastal and Marine Program has been implementing a multi-faceted marine conservation program together with the Indonesian Park authority. One of the modules of the conservation program entailed the deployment and installation of 25 mooring buoys that are suitable for local boats carrying dive tourists (Fig. 2, 3, 4, Table 1). However, these mooring buoys are suitable for relatively small boats only (max. length ca. 15 m) and only a small proportion of the dive and snorkel sites have moorings installed. With the endorsement of the 25 Year Master Plan for Management of Komodo National Park, stricter anchoring regulations were envisaged: the Master Plan prohibits anchoring in the Wilderness Zone, the Tourism Use Zone, the Special Research and Training Zone and in the Buffer Zones, except in waters with a 100% sandy bottom or anywhere in waters deeper than 30 meters. On all other locations only mooring buoys may be used tie up the boats. Hence, there was a need to deploy additional moorings, including moorings that are suitable for larger vessels (up to 300 GT or 40 m length). With the US\$ 50,000 grant from the Hardner Foundation, there was an opportunity to fulfill this need.

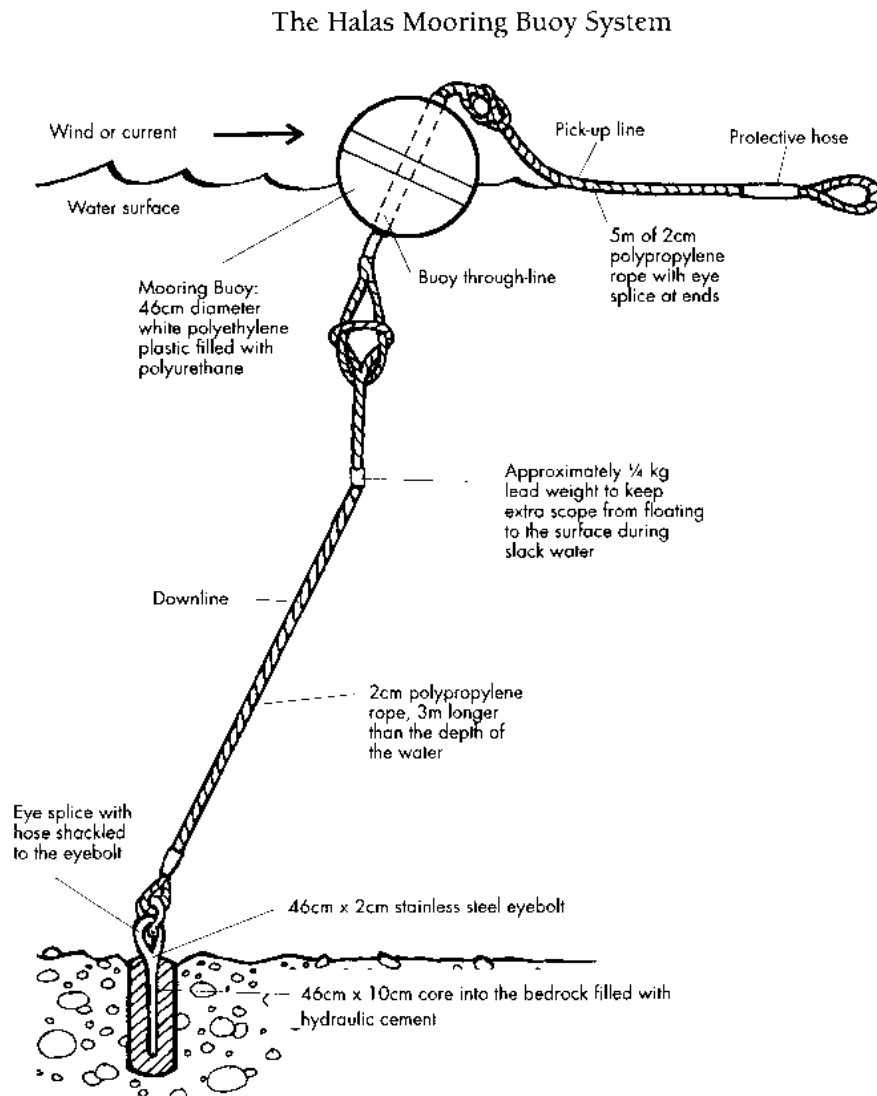


Figure 3. Schematic representation of the 'Halas system' that was used for the mooring buoys installed in Komodo National Park in 1996 and 1997.

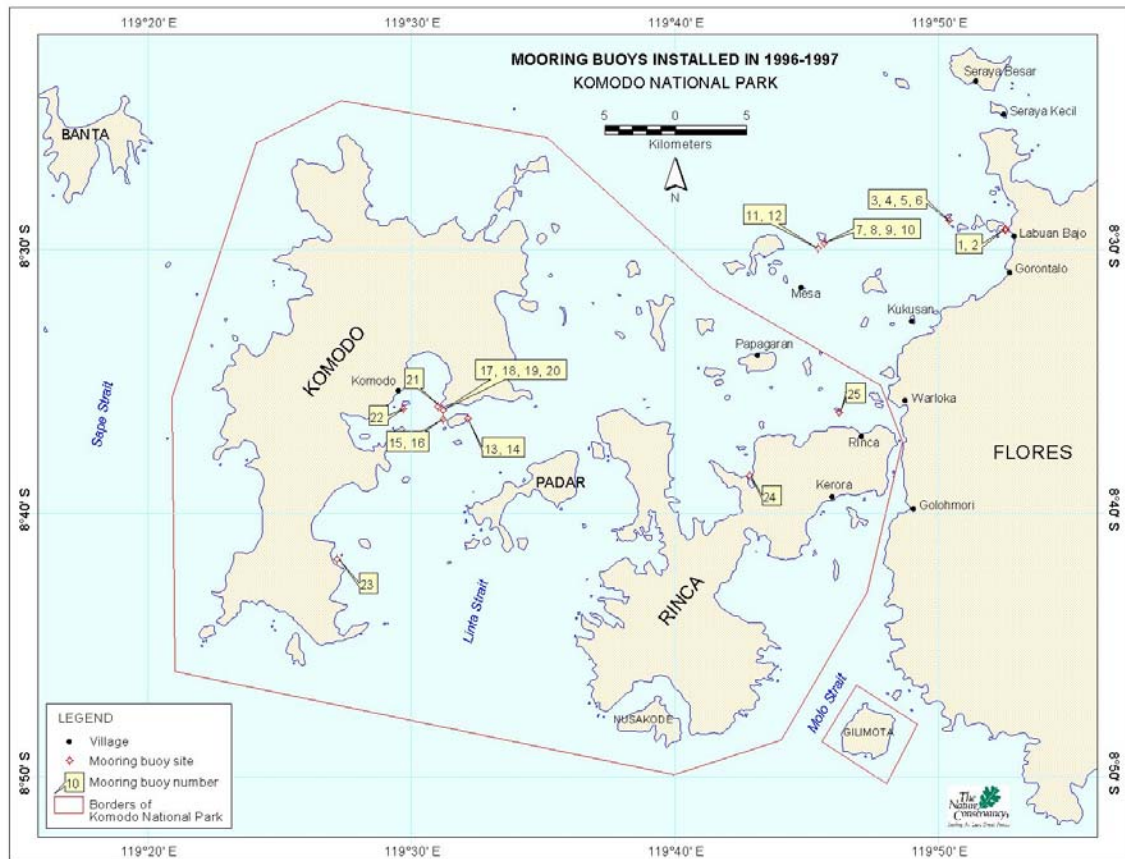


Figure 4. Map of Komodo National Park with location of moorings that were installed during 1996-1997. Mooring buoy numbers refer to Table 1.

Table 1. Mooring buoys that were installed in 1996 and 1997. Not all anchoring pins have buoys installed.

No Site	Area	Latitude (S)	Longitude (E)	No Site	Area	Latitude (S)	Longitude (E)	
1	Labuan Bajo Harbour	8°29.25"	119°52.53"	13	Pulau Punya	8°36.43"	119°32.15"	
2	Labuan Bajo Harbour	8°29.25"	119°52.55"	14	Pulau Punya	8°36.42"	119°32.15"	
3	Bidadari	8°28.92"	119°50.40"	15	Pulau Punya	8°36.47"	119°31.25"	
4	Bidadari	8°28°97"	119°50.40"	16	Pulau Punya	8°36.47"	119°31.22"	
5	Bidadari	8°29.00"	119°50.38"	17	Pantai Merah	8°36.13"	119°31.22"	
6	Bidadari	8°29.03"	119°50.38"	18	Pantai Merah	8°36.12"	119°31.20"	
7	Kanawa	8°29.78"	119°45.67"	19	Pantai Merah	8°36.15"	119°31.17"	
8	Kanawa	8°29.95"	119°45.63"	20	Pantai Merah	8°36.15"	119°31.13"	
9	Kanawa	8°30.12"	119°45.53"	21	Pantai Merah	8°35.98"	119°31.03"	
10	Kanawa	8°30.13"	119°45.38"	22	Pulau Lasa	8°36.07"	119°29.72"	
11	Kanawa	8°29.97"	119°45.43"	23	Loh Wau	Southeast Komodo	8°41.88"	119°27.08"
12	Kanawa	8°29.95"	119°45.40"	24	Loh Buaya	North Rinca	8°39.23"	119°42.88"
				25	Pulau Kalong	North Rinca	8°36.20"	119°46.25"

Planning, positioning and stakeholder involvement

Dive operators working in Komodo (now organized in the Nusatenggara Marine Tourism Association) brought up the need for additional mooring buoys on various occasions, and they identified a total of 11 sites during a meeting on February 8 2001 (Table 2). The Nature Conservancy submitted this list to the Head of

Table 2. Sites for mooring buoy deployment, as proposed by the dive operators.

Site	Area	Proposed number
Loh Dasami	South Rinca	2-3
Gililawa Laut	North Komodo	2
Loh Darat	North Komodo	2
Pantai Merah	East Komodo	2
Northeast to Tatawa Besar	Northern part of Komodo National Park	1
Loh Sera	Southeast Komodo	1
Northern Sebayor Kecil	Northern part of Komodo National Park	1
Bay in Southeastern Padar	Central part of Komodo National Park	1
Loh Liang	East Komodo	2 (low priority)
Southeastern Sabolon Kecil	North of Komodo National Park	1 (low priority)
Northern Banta	West of Komodo National Park	1

Komodo National Park for approval. After consultation with Park staff, and after working out a more detailed budget, 10 sites were selected for deployment of 'big boat' moorings (suitable for vessels up to 300 GT or 40 m length) and 5 sites for 'small boat' moorings (suitable for vessels up to 5 GT or ca. 10 m length) (Table 3, Fig. 5). In November 2001, this list was shared with the Nusatenggara Marine Tourism Association who agreed with the selected sites. Members of the Nusatenggara Marine Tourism Association pledged a total of US\$ 2,000 in support of the mooring buoy program, of which US\$ 1,300 materialized (situation up to June 2002).

Table 3. Final positions of mooring buoys (installed in January 2002).

No.	Site	Area	Latitude (S)	Longitude (E)	Depth (m)
<i>'Big Boat' moorings (up to 300 GT or ca. 40 m length)</i>					
1	Loh Dasami	South Rinca	8°47.389"	119°40.396"	25
2	Loh Dasami	South Rinca	8°47.165"	119°40.222"	22
3	Loh Dasami	South Rinca	8°47.312"	119°39.474"	27
4	Gililawa Laut	North Komodo	8°26.819"	119°34.158"	28
5	Gililawa Laut	North Komodo	8°26.852"	119°34.078"	20
6	Loh Darat	North Komodo	8°29.665"	119°33.080"	28
7	Loh Darat	North Komodo	8°29.600"	119°33.041"	22
8	Pantai Merah	East Komodo	8°36.374"	119°31.369"	33
9	Pantai Merah	East Komodo	8°36.360"	119°31.450"	25
10	Pantai Merah	East Komodo	8°36.100"	119°37.096"	25
<i>'Small Boat' moorings (up to 5 GT or ca. 10 m length)</i>					
a	Loh Dasami	South Rinca	8°47.320"	119°40.411"	15
b	Gililawa Laut	North Komodo	8°26.855"	119°34.100"	12
c	Loh Darat	North Komodo	8°29.450"	119°33.200"	20
d	Pantai Merah	East Komodo	8°36.100"	119°31.200"	18
e	Tatawa Besar	Northern part of Komodo National Park	8°31.120"	119°37.978"	21

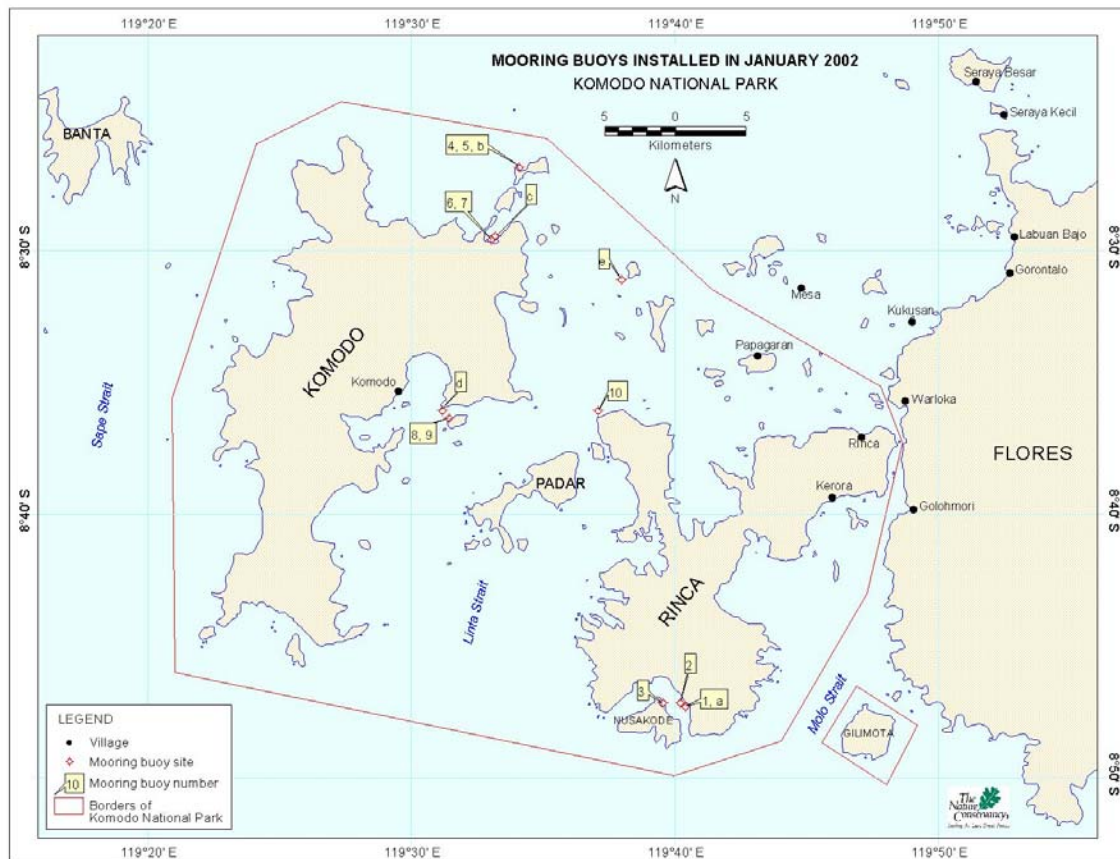


Figure 5. Map of Komodo National Park with locations of moorings that were installed in January 2002. Mooring buoy numbers refer to Table 3.

Design, deployment and use of the moorings

For the design and deployment of the moorings, Offshore Moorings from Australia was involved. Each ‘Big Boat’ mooring has two anchors of 750 kg each (Fig. 6), whereas the anchor of a ‘Small Boat’ mooring consists of ca. 400 kg of scrap metal chained together.

Hardware (chains, anchors etc.) and other supplies were sourced and ordered in Surabaya by a team comprising David Barnett (Director, Offshore Moorings), Mark Heighes (Marine Operations Manager, TNC CMPI) and Mirza Pedju (Program Officer, TNC CMPI) over the period October 28 – November 2 2001. The team also chartered MV ‘Duta Daerah’, a freight vessel that was to bring all supplies to Bima (Sumbawa). On November 30 – December 5, Mirza Pedju returned to Surabaya to make payments for all supplies and to load the MV ‘Duta Daerah’. On December 9, Mark Heighes flew from Labuan Bajo (Komodo) to Bima to take delivery of the cargo and he piloted MV ‘Duta Daerah’ to the designated mooring sites (Fig. 7- 11, cf. Table 3). All ground tackle (chains, anchors, etc.) was deployed at the mooring sites, whereas all ropes, floats and shackles were transferred to the MV ‘Evening Star’, which is based in Labuan Bajo.

Over the period January 12-21 2002, the moorings were installed by David Barnett and his co-workers (Jack Hall and John Cole). using the MV ‘Evening Star’ as a base. Other people involved in the installation were Mark Heighes, Michael Locke from MV ‘Evening Star’, and Jusuf Jenata from the Park authority. At the mooring sites, SCUBA divers put the anchors in positions using 2 liftbags (capacity 500 kg each). A dive compressor was used for filling the lift bags. The anchors were sunk in the sand using a water jet (a Honda-powered water pump with the 2.5” hose attached) (Fig. 12).

The moorings are now commonly used (Fig. 13-14). In 2002, additional 'Small Boat' moorings will be deployed using scrap metal donated by the local government. Furthermore, the already installed moorings will be re-fitted with steel cable instead of rope to prevent theft (three buoys were stolen over the period January – June 2002).

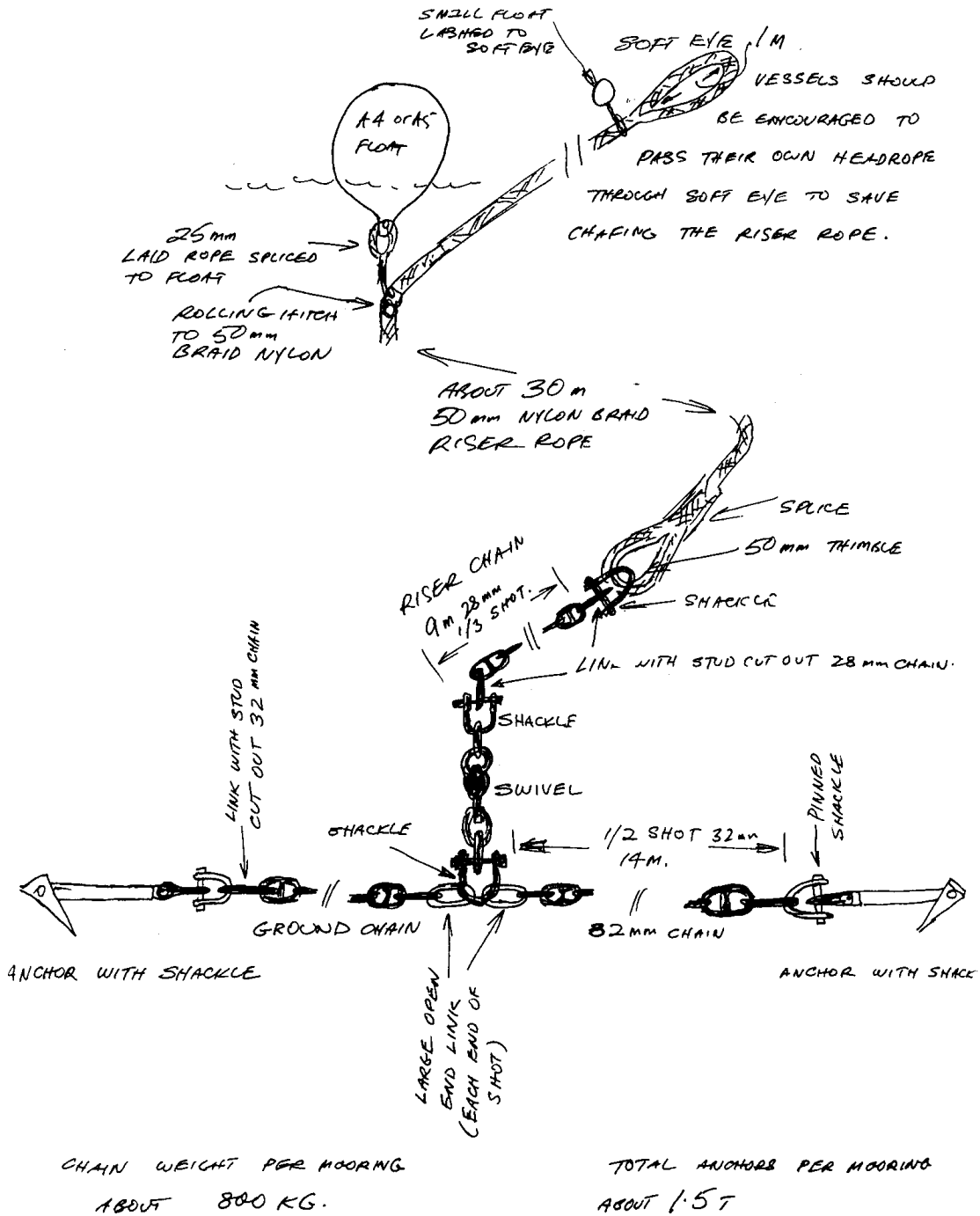


Figure 6. Drawing of 'Big Boat' moorings (courtesy David Barnett, Offshore Moorings).



Figure 7. MV 'Duta Daerah' that was used to transport supplies from Surabaya to Komodo via Bima. She also deployed all ground tackle on the designated mooring sites in Komodo.



Figure 10. Scrap metal and chains used as ground tackle for the moorings (onboard MV 'Duta Daerah').



Figure 8. Ground tackle being prepared for deployment onboard the MV 'Duta Daerah'.



Figure 11. Ground tackle for 'Small Boat' moorings being deployed by the MV 'Duta Daerah'.



Figure 9. One of the two anchors for a 'Big Boat' being prepared for deployment onboard the MV Duta Daerah.



Figure 12. SCUBA diver using a water jet to sink an anchor of one of the moorings into the sand.



Figure 13. Traditional live-aboard vessel moored near Pantai Merah (Pink Beach), one of the most heavily visited sites in Komodo National Park.



Figure 14. Phinisi live-aboard vessel 'Pindito' moored at Gililawa Laut, in the North of Komodo National Park.

Income and expenses

Total budget of the mooring buoys project was US\$ 52,000. Total income was US\$ 51,300. The lead contractor for mooring installation was Offshore Diving Pty Ltd (MV 'Evening Star'), who sub-contracted to Offshore Moorings, Australia.

Table 4. Income and expenses for the 2001-2002 mooring project in Komodo National Park

Income:		Expenses	
<i>Foundations</i>		Contractors mooring installation (incl. fees, travel, and charter MV Evening Star)	US\$ 18,840
Hardner Foundation Komodo	US\$ 50,000	Supplies, fees and travel for sourcing of supplies.	US\$ 23,160
Foundation	US\$ 200	Support from TNC CMPI (administration, project supervision by Peter Mous and Mark Heighes, project support from Mirza Pedju and other staff)	US\$ 10,000
<i>Dive Operators</i>		Total expenses	US\$ 52,000
Dive Komodo	US\$ 200		
Grand Komodo	US\$ 200		
Keraru	US\$ 200		
Ombak Biru / Putih	US\$ 200		
Pindito	US\$ 200		
Ambasi	US\$ 100		
Total income	US\$ 51,300		

Contacts

Offshore Diving. (represented in Indonesia by Dive Komodo)

Labuan Bajo, Flores, INDONESIA

phone / fax +62-(0)385-41422

Offshore Moorings

4 Stanhope St., Cottesloe WA 6011, AUSTRALIA

phone +61-(0)8-9385 1296, fax +61-(0)8-9384 0437

TNC Southeast Asia Center for Marine Protected Areas

Jl Pengembak 2, Sanur, Bali, INDONESIA

phone +62-(0)361-287272, fax +62-(0)361-270737