FINAL REPORT TO THE RUFFORD FOUNDATION

IMPACTS, ALTERNATIVE SOLUTIONS AND AWARENESS OF MOBULA FISHERIES IN INDONESIA

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Project Partners & Collaborators

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1. SUMMARY

Great concern is raised by the vulnerability of mobula rays to overfishing in Indonesia, due to the increasing demand for mobulid gill plates in the Chinese medicine market. Stakeholders are often unaware of the similar threats posed to mobulids and of the value of mobulas alive. Through fishing market surveys and interviews, the project provided urgently needed information on mobula rays in Indonesia to support conservation at a national level by (1) providing information on species-specific abundance and aggregation sites, (2) providing information on the species-specific feeding ecology of mobulas in Indonesia, and (3) raising stakeholder awareness of the problem while exploring solutions reduce mobula fisheries. Implementation of a national mobula ray protection has been recommended to the Government of Indonesia, due to slow growth and late maturity of mobulas, current fishing of pregnant females and juveniles, and relatively low value of mobula rays at fishing markets relative to other taxa. An education outreach program was conducted in schools of local communities, raising awareness in the future generation. Prior to and since the recent listing of mobula on Appendix II of CITES, results from the project have fueled ongoing discussions towards the implementation of adequate legislation measures in Indonesia.

2. INTRODUCTION

Mobulid rays (mantas and mobulas) are caught in target and bycatch fisheries in Indonesia, mainly for export of their gill plates as a product in the 'traditional' Chinese Medicine and dried seafood markets (Dewar, 2002; Heinrichs et al., 2011). The exportation of mobula parts (primarily gills) from Indonesia and other countries poses threats for population sustainability. The volume of gill plates sold between 2011 and 2013 was multiplied by +107% for *Mobula tarapacana* and by +204% for *Mobula japanica* (O'Malley et al., 2016). Four mobula species have been recorded in drift gillnet landings: *Mobula japanica*, *Mobula tarapacana*, *Mobula thurstoni* and *Mobula kuhlii*. Based on research conducted in Indonesia (White et al., 2006; Heinrichs et al., 2011; Dharmadi & Fahmi 2014; Lewis et al., 2015) and based on data reported to the FAO, 2013, there is evidence of declining trend in fisheries for mobula rays in Indonesia. More concerning is the fact that 96% of gills recorded in the Chinese market from 2011 to 2013 were from mobula species, while 4% belonged to Manta spp. (O'Malley et al., 2016).

Mobulids are considered vulnerable to overfishing because they possess long reproductive cycles, low fecundity, and late maturation (Notarbartolo-di Sciara, 1988; Dulvv et al., 2014). Due to the growing concern for population sustainability, and the high value of live manta rays for the Indonesia's tourism industry, a policy protecting manta rays at a national level was adopted in 2014. However, mobula rays do not currently benefit from any national protection, and have only recently been added to Appendix II of CITES (CoP17, 2016). Efforts are needed to assess life history parameters, distribution patterns and fishery trends of mobula species to understand the impact of exploitation and to provide recommendations for policy change (Couturier et al. 2012). The market value of gills acts as a strong incentive to land mobulas (O'Malley et al., 2016), and alternative income from these animals through ecotourism, has generally not been exploited in Indonesia, although it provides an important source of income to the Azores, where *Mobula tarapacana* aggregate seasonally (~8M USD derived from combined mobula and blue shark ecotourism per year) (Ressureicao, pers. comm.).

In an effort to gather important species-specific biological and ecological information on mobula rays, our project focused on key artisanal fishing sites in Indonesia (**fig. 1**): Muncar, Tanjung Luar and Lamakera. Each of these sites possesses tremendous biological diversity, as being part of the coral triangle, and

because they harbor at least three mobula species, including another two potential species previously recorded in Indonesia. This project was undertaken in partnership with the Manta Trust, a UK based charity that works worldwide to study mobulid rays and promote conservation through research and education. We also partnered with MantaWatch, who primarily organizes internships for Indonesian students to learn about manta rays in Komodo through photo-identification techniques.

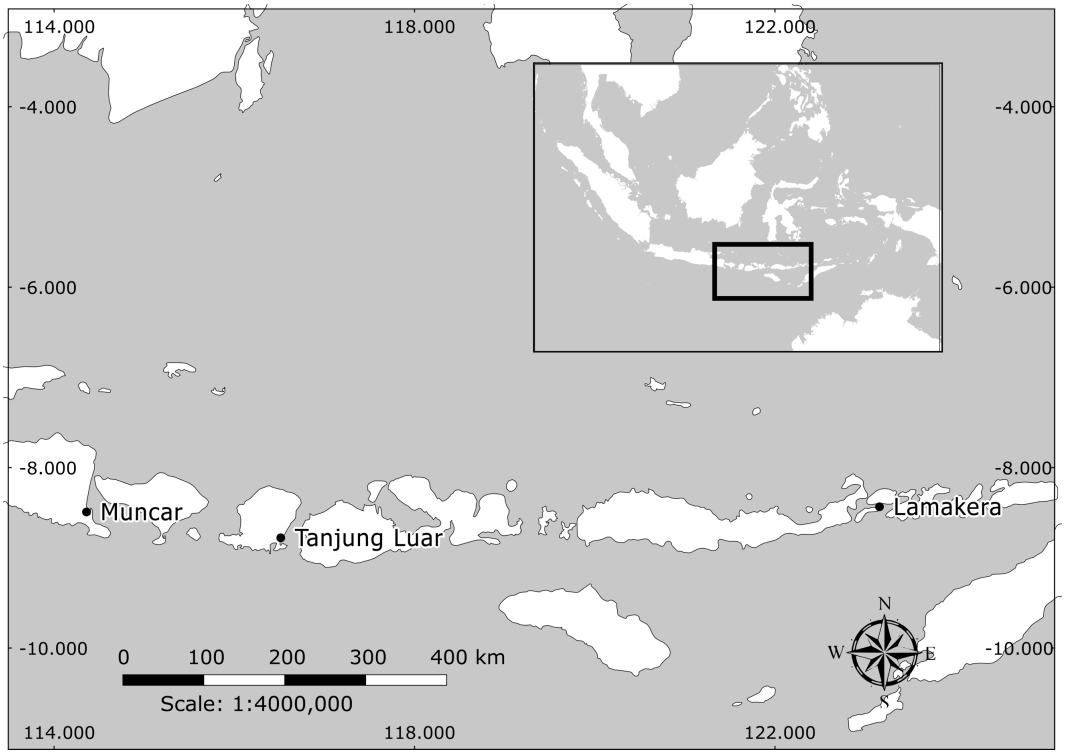


Fig. 1: Study locations: Muncar (East Java regency), Tanjung Luar (West Nusa Tenggara regency), and Lamakera (East Nusa Tenggara regency).

3. AIMS & OBJECTIVES

Project aim

The project aims to initiate conservation of mobula rays in Indonesia by initiating the implementation of appropriate management, and providing urgently needed information on the genus. The purpose of the project was to produce valuable information to assess vulnerability of the genus to Indonesian fisheries, information on species-specific abundance of mobulas at key landing sites, a map of mobula main aggregation sites, and increased awareness of mobula biology, ecology and conservation through increased communication gradually inspiring long-term changes in the behavior of stakeholders on a local and national level.

Project objectives

1. Determine the habitat use (abundance and aggregation sites) of mobulas in East Java, West and East Nusa Tenggara to target conservation measures;
2. Study the feeding ecology of mobula rays in Indonesia;
3. Develop an educational program to raise the awareness of stakeholders about the importance of conserving mobulas for long-term sustainability and identify alternative solutions to reduce target and by- catch mobula fisheries.

4. METHODS

***Objective 1:* Mobula abundance and aggregation sites**

Market surveys

Mobula disc-width (mm), disc-length (mm), weight (kg), sex, and external maturity evidence of maturity was collected at fishing ports in Tanjung Luar, Muncar, and Lamakera. Mobula landings were expressed in number of individuals per week. Differences in the proportion of species between sites were assessed using Z-tests. Differences in the proportion of males and females in each species were assessed in a binomial test, with 0.5 as the expected proportion for equal occurrence of males and females.

Fishermen interviews

After a mobula-ID introduction, at total of 37 Interviews were carried out with fishermen in Tanjung Luar and Muncar. A total of 47 questions focused on (1) social background, (2) spatio-temporal trends in mobula fisheries, and (3) alternatives to mobula fisheries. Responses were described in terms of percentage respondents per QCM answer, while open-ended quantitative questions were analyzed using descriptive statistics.

***Objective 2:* Feeding ecology of mobula rays in Indonesia**

Stomach content subsamples were stained overnight with Rose Bengal and 2 mL subsamples were placed into a petri dish under an imaging microscope, until all or up to a hundred prey items were counted. When pieces of individual prey items were found and could be identified, the item was counted. The percent of relative importance (%IRI = (%N + %M) %F) was used to describe stomach contents (Pinkas et al., 1971; Cortes, 1997).

$$TP_{SCA\,(x)} = \Sigma\,(P_i * TP_i) + 1$$

Where $TP_{SCA\,(x)}$ is the trophic level estimate of the respective mobula species, P_i is the proportion (proportion by count excluding unidentified prey items) of the *i*th prey item and TP_i is the trophic position of the respective prey item, as reported in the literature (Vander Zanden et al., 1997). For the estimation of $TP_{SCA,}$ unidentified prey items were excluded from total prey count to derive relative proportions of each prey item.

***Objective 3:* Awareness and alternative solutions**

Education awareness

Education awareness materials were designed and targeted to different age groups: a booklet for primary school children (in annex) and a leaflet for secondary school and above (in annex). A 1-hour session was conducted in a classroom in the presence of the teacher. First, a short presentation about mobulid rays was given including key facts, threats and conservation needs, followed by a short video to showcase mobulas

in their natural environment, followed by a quiz and the distribution of stickers from the project and a snack. Booklets distributed to children contained a story with a mobula ray as the main protagonist, who is caught by a gillnet and further released. Key facts about mobula rays are provided as well as a coloring page. The leaflet contained a summary of mobula biology, ecology, threats and conservation needs, an infographic of the mobulid ray supply chain from Indonesia to the Chinese market, and a short comic portraying fishermen thinking of alternative solutions to mobulid/ shark fisheries.

Workshops

Workshops were conducted with two groups of stakeholders: (1) fishermen at fishing ports, (2) governmental and non-governmental organizations (NGOs). Fishermen were given mobula identification training prior to interviews in small groups (Tanjung Luar) or individually (Muncar). Official workshops were also conducted with governmental and NGOs to present data collected during the project, and to initiate open discussions to incentivize voting in favor of the addition of mobulas to Appendix II of CITES, while promoting policy change at a national level.

5. RESULTS

***Objective 1:* Mobula abundance and aggregation sites**

Species-specific abundance

Taking into account only the specimens for which sex could be identified, the sex ratio of *Mobula japanica* was significantly different from equal proportions (N = 42, p = 0.28), with females representing 59.5% of the sample and males representing 40.5%. The sex ratio of *Mobula thurstoni* was also significantly different from equal proportions (N = 14, p = 0.42), with females representing 64.3% of the sample and males representing 35.7%. All *Mobula tarapacana* specimens were females. Proportion of mobulas recorded and their average disc width during 2015 surveys is presented in figure 2. In Muncar, the female maturity stage varied as a function of species, with juvenile and mature (non-pregnant) females representing most of the *Mobula japanica* sample, while pregnant females were the most abundant category of females in *Mobula thurstoni* (fig. 2). Although no *Mobula tarapacana* fetuses or pregnant females were found, at least one of the specimen present was likely a juvenile due to their relatively small disc width (194 cm), which was much smaller to the estimated size at maturity of 270-280 cm disc width (Notarbartolo-di-Sciara, 1988). The proportion of each mobula species landed in Muncar was similar in October 2015 and 2016, although it differed in November 2015 and 2016 (fig. 3), with only *M. japanica* landed in the latter year. No mobula landings were recorded in December 2016, which was explained by fishermen as due to "exceptional environmental conditions this year with lower amounts of productivity and small fish in the area", and "bad weather leading to fewer boat trips". In Tanjung Luar fishermen-perceived mobula abundance seasonality is shown in fig. 4**.** Key fishery characteristics and spatio-temporal trends are reported in boxes A and B.

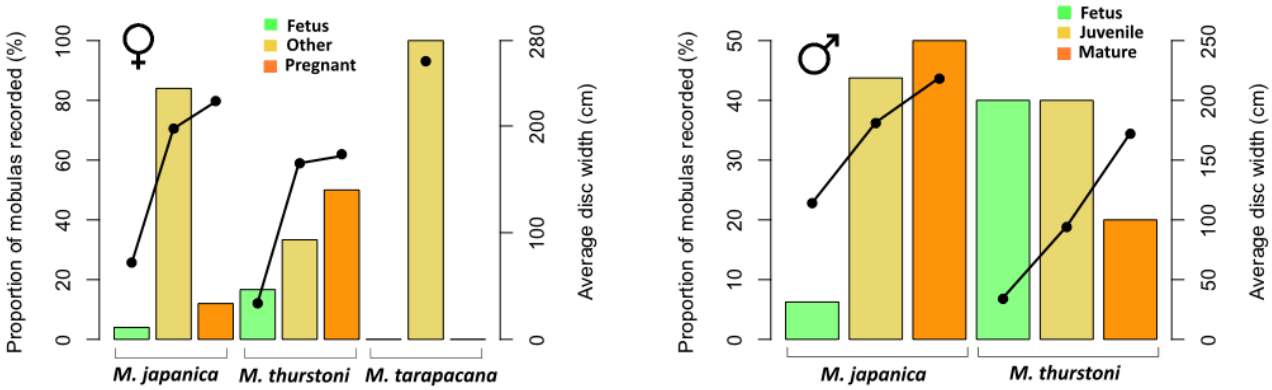


Fig. 2: Bar plots representing the proportion (%) of fetuses, pregnant, and other maturity stage (juvenile or mature) females (left panel), and the proportion (%) of fetuses, juveniles, and mature males (right panel) recorded in Muncar. Points represent the average disc width (cm) for each maturity category.

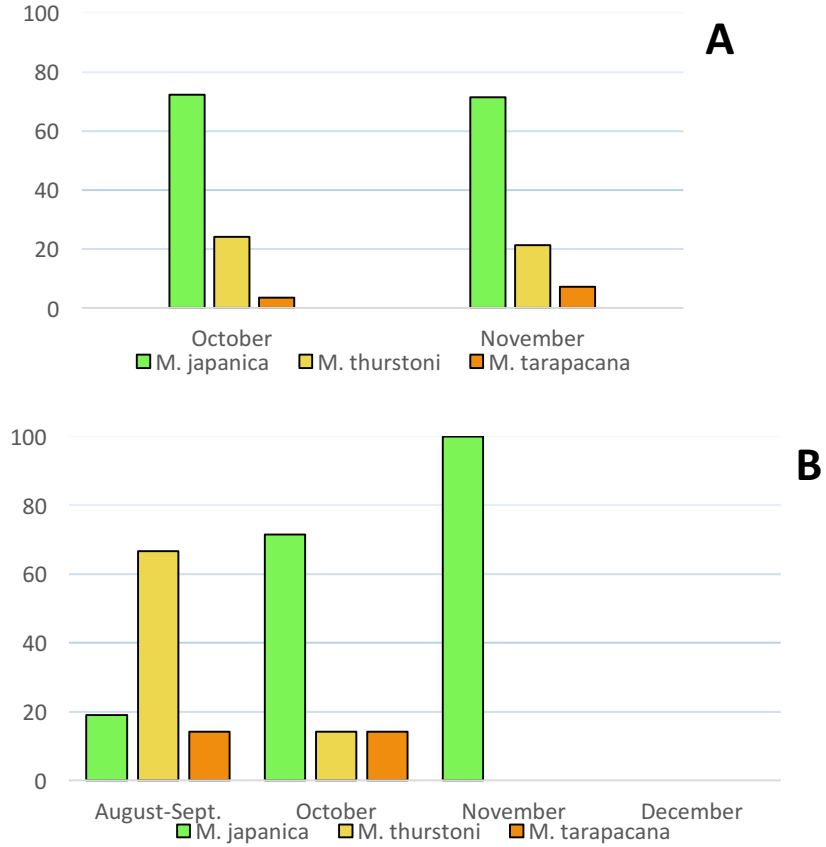


Fig. 3: Top panel (A): Bar plots representing the proportion (%) of each mobula species landed in Muncar fishing market in 2015 surveys, and **lower panel (B):** during 2016 surveys.

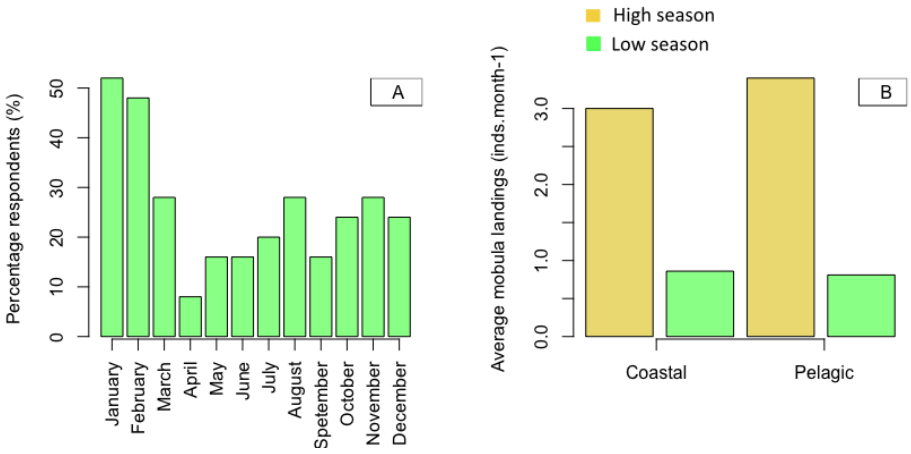


Fig. 4: Mobula landings seasonality, as perceived by fishermen in Tanjung Luar. **Left panel (A)**: barplots representing the percentage of respondents considering the given month is part of the high season for mobula landings. **Right panel (B)**: barplot representing the average mobula landings during the high (yellow), and the low (green) season.

Aggregation sites

Aggregation sites that correspond to fishing grounds for gillnetters from Muncar were determined through fishermen interviews are presented on figure 5, which has been adapted from the base map created by the

Ministry of Fisheries and marine Affairs of Indonesia. These represent main fishing grounds, hence fishermen do occasionally fish in areas outside this zone, for example further North in the Bali Strait (eg. around zone 1). Productivity is likely to be a key driver in mobula at aggregation at sites around Muncar, as inferred from mean chlorophyll-*a* concentration (Chl-a, in mg/m^3), and mean sea surface temperature (SST, °C) measured by Aqua MODIS, for the period of sample collection in Muncar (October 15th to October 31st and from November 1st to November 6th 2015), with relatively higher productivity that surrounding areas associated with the El Nino Southern Oscillation phenomenon of late 2015 (fig. 6).

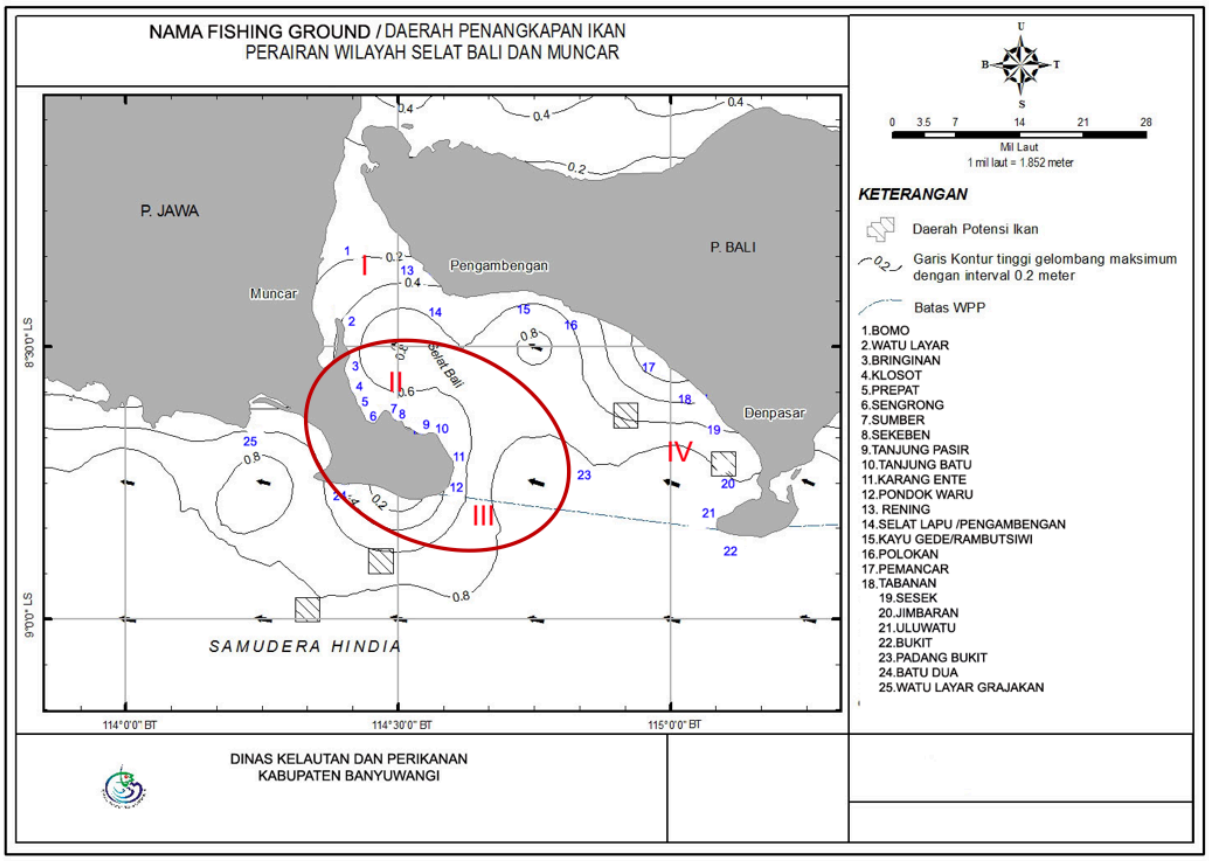


Fig. 5: Ministry of Fisheries recognized fishing grounds in the Bali strait, with mobula ray fishing grounds for Muncar fishermen circled in red, as per interviews conducted in December 2016.

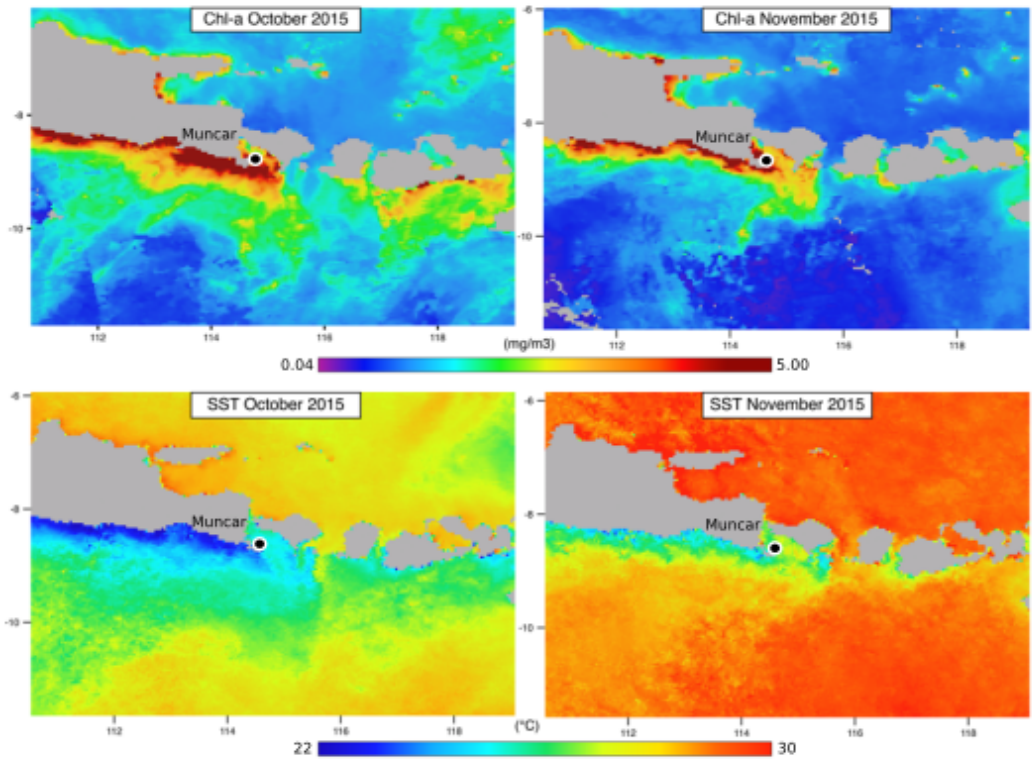


Fig.6: Indication of upwelling/ productivity gradients as inferred from mean chlorophyll-*a* concentration (Chl-a, in mg/m^3), and mean sea surface temperature (SST, °C) measured by Aqua MODIS (http://oceanwatch.pfeg.noaa.gov), for the period of sample collection in Muncar (October 15th to October 31st and from November 1st to November 6th 2015). The black circles represent the main mobula ray fishing ground in proximity of Muncar, where mobula rays used in the mixing model were landed.

***Objective 2:* Feeding ecology of mobula rays in Indonesia**

Main prey items in *Mobula japanica* (n = 7) were euphausiid eggs by count (49.33%) and euphausiids by %IRI (74.21%). In *Mobula thurstoni* (n = 3) the main prey item by count and %IRI was euphausiids (67.65% and 90.52%, respectively). In *Mobula tarapacana* (n = 3), the main prey item by count was euphausiids (55.25%) while the main prey items by %IRI was clupeids (*Sardinella* spp., 49.07%).

Species Location DW (Sex)	*Mobula japanica (n = 7)* Muncar, Lamakera			*Mobula thurstoni (n =3)* Muncar, Tanjung Luar			*Mobula tarapacana (n =3)* Muncar, Lamakera		
Prey	**% Count**	**%IRI**	**Mean TL (n)**	**% Count**	**%IRI**	**Mean TL (n)**	**% Count**	**%IRI**	**Mean TL (n)**
Euphausiidae	47.87	74.21	17.3 (24)	67.65	90.52	17.07(1)	54.9	45.4	16.17 (5)
Euphausiidae eggs	49.33	24.83	0.43 (4)	11.76	3.22	0.49 (4)	1.65	0.63	0.39 (3)
Clupeidae	0.27	0.05	8.25 (2)	0	0	NA	37.4	49.07	69.3 (39)
Copepoda	1.2	0.5	1.8 (5)	5.88	1.61	2.1 (2)	1.1	0.53	0.97 (1)
Leiognathidae	0	0	NA	0	0	NA	1.65	1.33	63.4 (3)
Scombridae	0	0	NA	0	0	NA	0.55	5.45	225.0 (1)
Decapoda	0.13	0.01	3.1 (1)	0	0	NA	0.55	0.32	1.22 (1)
Algae fragments	0.13	0.01	4.2 (1)	0	0	NA	0	0	NA
Unidentified	1.07	0.38	5.4 (8)	14.71	4.64	6.28 (5)	0	0	NA

<u>Objective 3:</u> Awareness and alternative solutions

Education awareness

A total of 364 school children were reached through our project outreach activities. We reached 210 school children at two schools in Tanjung Luar, which gave more than 90% correct answer at oral quiz of students gave correct answers during quiz (the remaining 10% gave incomplete not incorrect answers) (fig. 7). Additionally, we reached 154 students (60 primary school students across 3 sessions and 94 11th graders) in Labuan Bajo during outreach in collaboration with MantaWatch interns. Primary school students answered correctly to the quiz 83% of the time in the first session (4th graders), 39% of the time in the second session (4th graders), and 100% of the time in the time in the third session (5th graders). The difficulty encountered by 4th graders in the second session was in a questions concerning the diet of mobulids, as they did not include plankton in the answer. Due to their young age and the novelty of plankton for these children, the question was likely too difficult for their age-group (and had not been included in the quiz at the first session). During the session with secondary school students, instead of a quiz with one possible correct response, students were encouraged to share opinions about what they had learnt concerning mobula threats and value, such as '*Why we should take care of Mobulids instead of killing/fishing them?*' and '*Why are mobulids valuable when they are kept alive?*'. Students provided rich and encouraging responses to these questions, which demonstrates the effectiveness of the outreach sessions as qualitative measure.

Fig. 7: Tanjung Luar education outreach, 14th & 15th August 2015.

Potential solutions through policy and management

Interviews conducted with fishermen (fig. 8), along with other data from the project provided information on potential alternative ways to reduce mobula ray landings, which were further discussed at workshops with the government. Three major workshops, on April 13th 2016, on April 22nd (pre-CITES workshops) and on January 5th 2017 were conducted at the Ministry of Fisheries and Marine Affairs in Jakarta, with attendees from various key organizations (fig. 9), while meetings with individual governmental and non-governmental organizations took place throughout the project. The first and second workshops were aimed at introducing research that had been conducted previously in Indonesia and Worldwide, including by our project, to request support from the Indonesian Government to support the addition of mobula rays to Appendix II of CITES (CoP17). The last workshop was held to present data collected during our project, to review the recent research available from the literature, and to discuss policy change in Indonesia to promote better management and conservation of mobula rays.

1. Fisheries management and policy change

The Indonesian government drafted a ban on mobula exports which will come into effect during 2017, in accordance with the recent addition of mobula rays to the Appendix II of CITES. A national protection of manta rays is in place since 2014, which could be extended to mobula rays, which are equally possess vulnerable life histories but remain exploited at high levels primarily for export of gills. Such a regulation would further facilitate enforcement by customs officials at borders, for example since any gill plate export would be prohibited. Quotas and size restrictions on mobulas landed would unlikely be inadequate management solutions since there are immense enforcement difficulties. Size limitations would equally be challenging to implement and not necessarily useful for sustaining mobula populations on a national level, because limiting catch to larger females and males for example would likely diminish reproductively active individuals in already threatened populations. Importantly, it would be impossible to avoid landing gravid females since it is extremely difficult or impossible to identify gravid females before they have been landed and eviscerated. However, although enforcement capacity is limited in Indonesia, regulating fisheries in areas of high vulnerability such as breeding and parturition grounds in proximity of the Bali Strait, and

eventual migration routes (through telemetry etc.) could eventually minimize catch for example by putting seasonal closures in place. However, in the case of non-target fisheries, mechanisms to reduce bycatch before landing has occurred should be investigated.

2. Bycatch reduction

Mobulas are often defined as bycatch in Indonesian gillnets, although our study suggests that mobula rays are often 'secondary targets', meaning that fishermen will target mobula rays and set nets at known mobula aggregation sites purposely in the absence of lights ("which repel mobula rays" fishermen interviews in Muncar), although true bycatch (unintentional catch of a species while targeting another species) does occur. In Muncar, primary targets include tuna, marlin, swordfish, mahi-mahi, and thresher shark. In Tanjung Luar pelagic fisheries, the primary target of fishermen is large sharks (fig. 10), which are caught on longlines, and which occasionally hook large *Mobula tarapacana*, or *Mobula japanica* (the latter less frequently) individuals, however fishermen also use modified drift gillnets to target mobula schools. In coastal fisheries, when mobula rays are landed they are caught in gillnets along with tuna or targeted by harpoon. In Lamakera, mobula rays do not represent bycatch since they are targeted by harpoon. Currently, it is difficult to determine which proportion of the landings in Muncar and Tanjung Luar represent true bycatch (unintentionally caught specimens landed while targeting other species) and which proportion constitutes 'secondary target' or target fisheries. If a national protection on mobula rays in achieved, a zero-TAC regulation (no take allowed) would best enable to ensure that mobulas targeted by fishermen are not unlawfully declared as bycatch, hence escaping regulation in a situation other than zero TAC. Measures to reduce bycatch, both before it occurs and as post-catch release guidelines will be investigated in further project phases, in collaboration with the Ministry of Fisheries (e.g. sensory repellents such as visual or electrosensory repellents).

3. Ecotourism development

Mobula ray ecotourism is largely undeveloped in Indonesia and currently, tourism is targeted at manta ray aggregations in National Park regions such as Komodo National Park and Raja Ampat, where mobula rays can occasionally be encountered (e.g. photo below). Given the proximity of aggregation sites in the Bali strait (as well as anecdotal accounts from other locations) more research is needed to assess whether ecotourism is a realistic alternative solution to fisheries in these areas, which harbor mainly fishing grounds.

Fig. 8: Fishermen are interviewed by Vidlia Rosady and Eis Zulfaty at home for more in depth conversations in Muncar (December 2017).

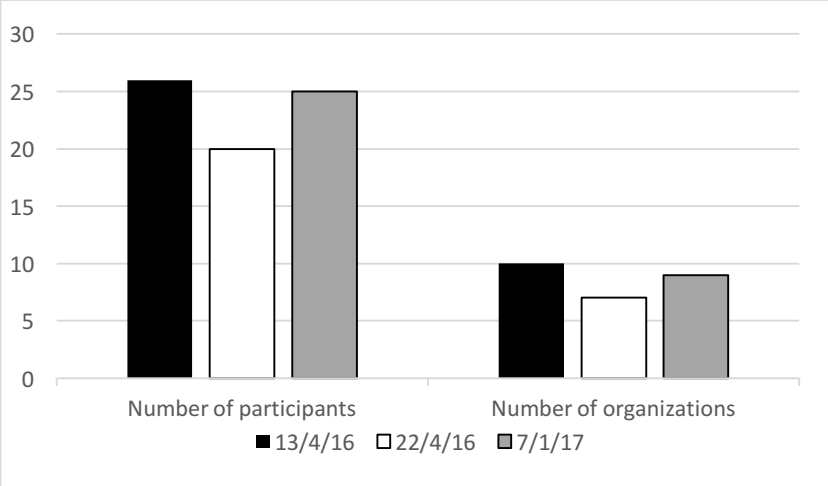


Fig. 9: Attendance statistics for workshops held at the Ministry of Marine Affairs and Fisheries.

Fig. 10: Main target of pelagic fishing boats departing from Tanjung Luar (large sharks- LEFT), and a typical fishing boat about to unload the catch in Tanjung Luar.

Application of results

The launching of our online photograph collection was communicated online on our website and through posters distributed to dive centers (e.g. fig. 11). Project results have been communicated to the Indonesian Government at two stages of the project: intermediary (April 2016) and final (January-ongoing 2017) through a report and through presentation of findings during workshops conducted in Jakarta (fig.12). In April 2016, findings were presented within workshops aimed at gaining support of the Indonesian Government for the addition of mobula rays to Appendix II of CITES. Discussions concerning mobula ray national policy started in March 2016 and are ongoing with the Ministry of Fisheries and the National Institute of Sciences (LIPI), while conservation efforts and further directions are being discussed with other

stakeholders such as International NGOs (e.g. Wildlife Conservation Society, Conservation International, World Wildlife Fund).

Fig. 11: Diving mobula ID-guide and photo database announcement hanging on the wall of a dive center in Labuan Bajo, Komodo amongst manta rays photo-ID shots, which are much more frequent in the area.

Fig. 12: Workshops with governmental and nongovernmental institution representatives at the Ministry of Marine Affairs and Fisheries in Jakarta (upper: April 2016, middle and lower: January 2017).

Figure: Sample of education outreach materials distributed to schools.

6. CONCLUSION

The project confirmed that mobula rays are targeted in Lamakera, and shows that they are also targeted as bycatch in Tanjung Luar and as 'secondary target' and bycatch in Muncar, leading to catches of juveniles, adults and pregnant females of the species *Mobula thurstoni* and *Mobula japanica* and juveniles/ adults of the specie *Mobula tarapacana*. Preliminary stomach content analyses suggest that mobula rays feed on blooms of euphausiids and on small teleosts in Indonesia. We successfully interviewed 37 fishermen in two fishing communities in East Java and Lombok, providing insight into perceived spatio-temporal trends in mobula fisheries, respondent background and information useful to identify alternative solutions to reduce mobula fisheries. The project identified potential solutions to reduce mobula ray landings in Indonesia, which were presented to stakeholders to induce adequate policy implementation. The education outreach program for schools and encounters with fishermen put in place the first steps to support the rise of favorable outlooks towards mobula conservation within local communities. Policy change should be implemented in Indonesia to protect mobula rays nationally urgently, due to conservative life-history and fishery trends, furthermore research into mobula ray populations inhabiting Indonesian waters is necessary to better understand how current fishing pressure is impacting populations and to monitor the evolution of populations in the face of potentially changing anthropogenic threat intensity.

7. FURTHER DIRECTIONS

In the future we will aim to focus on the following main areas: (1) policy change and implementation in Indonesia, (2) continued monitoring of abundance from market surveys and in-situ observations, (3) estimation of mobula ray species-specific population size, (4) education outreach, (5) bycatch reduction efforts. Within (1) we will continue leading workshops with the government in collaboration with our partners at Manta Trust to support the government in their policy decisions to sustain mobula ray populations and to provide training in terms of, for example, policy enforcement. Within (2) we will aim to

continue market surveys in Muncar and to extend efforts to other places in Indonesia which have not currently benefitted from landing surveys. Within (3) we will aim to obtain funding to conduct a study on population genetics to estimate effective population size for *M. japanica*, *M. thurstoni* and *M. tarapacana*, which would greatly support stock assessments in Indonesia. Within (4) we will aim to perform education outreach activities in local fishing communities and in Universities containing a marine biology program, and (5) we will aim to apply biological and ecological knowledge of mobula rays to reduce bycatch.

APPENDICES

Appendix I: Mobula-ID guide used for workshops and distributed to dive centers, also available in Bahasa Indonesia.

Appendix II: Information poster distributed to dive centers for the photo-database.

HELP US STUDY MOBULAS!

PARNAHKAH ANDA MELIHAT MOBULA ?

Anda dapat membantu kami mempelajari kelimpahan dan distribusi Mobula di perairan Indonesia untuk membantu mengetahui biologi dan ekologi Mobula. Kami menerima foto lama dan foto baru dari Mobula yang anda lihat Semua yang kamu butuhkan hanya mengirim data pengamatan atau foto. (lokasi, tanggal dan perkiraan jumlah mobula yang terlihat) ke **info@mobulaproject.com**

TELL US ABOUT YOUR SIGHTINGS AND SEND PHOTOS!

You can help us study their abundance and distribution in Indonesian waters by reporting your sighting (with location, date, time, and estimated number of individuals) and sending eventual photos! We welcome recent and old photos and sightings.

Send to: info@mobulaproject.com

MORE INFO at www.mobulaproject.com

MOBULA VS MANTA?

MOBULA	MANTA
Mulut di bawah. Mouth below body.	**Mulut di depan.** Terminal mouth.

Abu-abu, coklat sampai hitam di atas. Putih di bawah (bisa abu-abu).

Dark grey, brownish or black on back. White on ventral side (can have light grey markings).

Putih dan hitam di atas. Putih dan biasanya bintik-bintik hitam di bawah.

Black and white above. Usually white with black spots on ventral side. Occasionally black.


Di atas

Di bawah

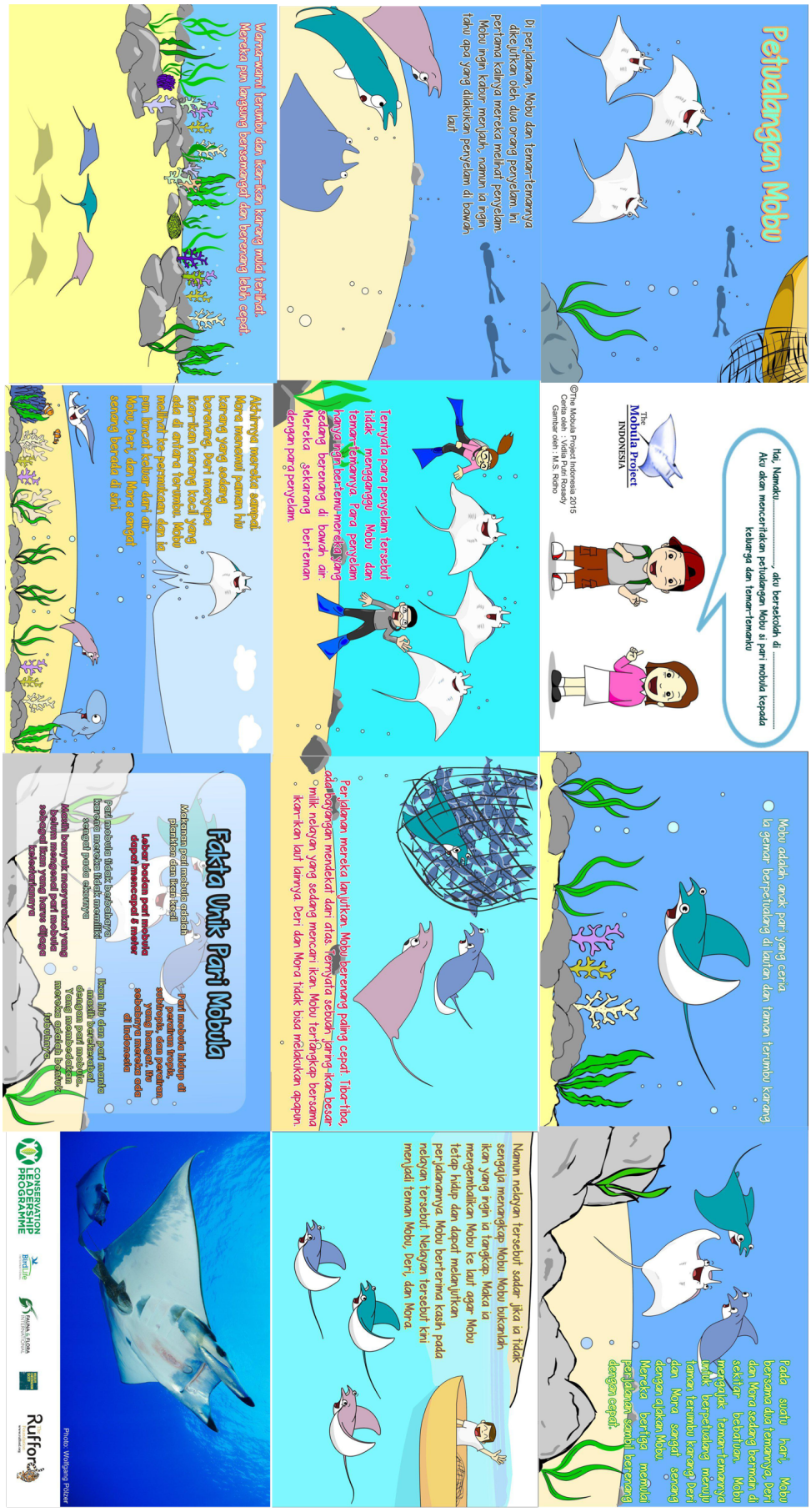
Like us on Facebook: The Mobula Project Indonesia

The Mobula Project

CONSERVATION LEADERSHIP PROGRAMME

The Rufford Foundation

Appendix III: Extract from booklet distributed to primary school children during outreach activities.



Appendix IV: Extract of leaflet created for secondary school students and above.

CONSERVATION LEADERSHIP PROGRAMME

The Mobula Project INDONESIA

The Rufford Foundation

Penjangkauan pendidikan 2015

MEMENUHI PARI MOBULA

Proyek

Proyek ini telah dimulai sejak Juli 2015 dan didanai oleh Conservation Leadership Programme dan The Rufford Foundation. Proyek ini bertujuan untuk memahami dampak, solusi alternatif, dan kesadaran terhadap perikanan pari mobula di Indonesia. Kegiatan kami termasuk survey ke tempat penjualan ikan, 'citizen science', dan wawancara untuk menyediakan informasi mengenai biologi dan ekologi dari pari Mobula spp. dan untuk mengimplementasikan kesadaran komunitas.

Pari Mobula dan Pari Manta

Pari Manta dan Pari Mobula berasal dari famili ikan yang sama, yaitu Mobulidae. Terdapat 5 spesies Pari Mobula dan 2 spesies Pari Manta (Pari Manta oseanik dan Pari Manta terumbu) yang ditemukan di Indonesia. Mereka berenang di kolom air dengan menggerakan sirip pektoral yang berbentuk seperti sayap, membuat mereka mampu berenang cepat (mencapai 6 meter per detik) dan menempuh jarak migrasi yang jauh (hingga 1000 km).

Pari Mobula
(Mobula tarapacana)

Pari Manta
(Manta alfredi)

Mereka mengalirkan air laut melalui insang untuk menyaring plankton dan ikan cekil sebagai makanan. Walaupun begitu biologi dan ekologi pari mobula belum banyak diketahui, mereka mempunyai beberapa karakteristik yang sama dengan Pari Manta: pertumbuhan yang lambat, masa dewasa yang lama, dan fekunditas yang rendah (mereka tidak dapat memproduksi banyak juvenil -kurang dari satu ekor pertahun), yang mana membuat mereka sangat mudah terancam jika ditangkap, karena mereka tidak dapat bereproduksi cukup cepat untuk mengimbangi tekanan penangkapan. Mobula dapat dibedakan dengan Manta dari tiga kareakterist: a) Letak mulutnya b) warna kulitnya, dan c) ukurannya. Manta biasanya lebih besar dari Mobula. Mulut mobula terletak dibawah badannya, dimana manta mempunya mulut yang sejajar.

Website: http://www.mobulaproject.com/
Like us on Facebook: The Mobula Project Indonesia

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