

PESUT MAHAKAM CONSERVATION PROGRAM

2010-2011

Increasing the sustainability of freshwater protected areas for the critically endangered Irrawaddy dolphin in the Mahakam River, East Kalimantan, Indonesia

FINAL TECHNICAL REPORT



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CONSERVATION FOUNDATION FOR RARE AQUATIC SPECIES OF INDONESIA



IUCN/SSC/CSG

PREFACE AND ACKNOWLEDGEMENTS

This report presents the progress results of conservation activities that have been and are being executed between 1 July 2010 - 31 June 2011 in the framework of the Pesut Mahakam Conservation Program 2010-2011, involving a district workshop in Sendawar, West Kutai, East Kalimantan that was held on the 6th of October 2010 and another one on the 9th of May 2011 in sub-district Muara Pahu, West Kutai in order to establish a multiple stakeholder management plan for the protected dolphin area in Muara Pahu sub-district with inter-institutional task division and coordinated action. Other activities involved conducting two extensive dolphin monitoring surveys between September and November 2010 to estimate dolphin abundance and assess new threats, mortality rates etc. A start was made with initiating sustainable fisheries in Central Kutai District in primary dolphin habitat in the form of helping poor fishermen that depend on direct fishing with gillnets to engage in aquaculture while using non-piscivorous fish species to reduce pressure on natural fish resources and obtain local awareness and support for dolphin conservation. Water quality sampling in the protected dolphin area of Muara Pahu has been conducted and analyzed to obtain an idea of the extent of pollution from oilpalm plantations and coalmining in the area. Furthermore, awareness campaigns with a main focus on the conservation of the pesut were conducted in January 2011 involving 13 elementary schools in the middle Mahakam area and our visits were received with great enthusiasm. Finally, initial socialization and coordination with government departments was conducted in Central Kutai for the second proposed protected dolphin area and a community workshop in Kota Bangun, Central Kutai where a community agreement was obtained for the establishment. This result will be handed to the Regent of Central Kutai to obtain an official decree for area protection.

We are most grateful for the support of Ocean Park Conservation Foundation Hong Kong, World Wide Fund for Nature, The Rufford Small Grants Foundation and IUCN/ SSC Cetacean Specialist Group, which enabled us to conduct these and upcoming activities, which are considered crucial for the long-term preservation of the Pesut Mahakam, its habitat and other wildlife. Therefore, on behalf of Yayasan Konservasi RASI, we would like to thank you most sincerely for your contribution. We hope for your future support towards long-term survival of Indonesia's only and critically endangered freshwater dolphin population.

Samarinda, 15 June 2011,



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PROJECT BACKGROUND AND OBJECTIVES

This project is part of the larger „Pesut Mahakam Conservation Program“, which started since 2000 by the local NGO Yayasan Konservasi RASI and is an ongoing program to protect the unique middle Mahakam river, lakes and wetlands area, which is one of Kalimantan’s largest wetland areas including its rich, diverse fauna. The proposed program will determine zones for the protection of dolphin, breeding birds, and fish spawning sites to safeguard biodiversity and future fish potential and familiarizing fishers with more sustainable fishing methods. The program also aims to save fauna occurring in the area with a particular reference to the critically endangered freshwater Irrawaddy dolphin species, *Orcaella brevirostris*, which is locally named „pesut“ and of which the remaining population has been estimated at 90 individuals (Kreb *et al.*, 2010). The pesut mostly occurs in the Middle Mahakam Area (MMA), which makes it therefore an excellent flagship species for the protection of this unique area (Figure 1). This program helps to protect their habitat and food resources.

The current project focuses largely on the sustainable management of a 4.100 ha large and 80 km-long protected dolphin area (PA) in West Kutai District and establishment of another PA of 2.800 ha size and 60 km length in Central Kutai district (Figure 1). The first area has already obtained an official districts decree for its establishment, but there is no official management plan with policies and regulations yet. The second area still has to obtain official status. Both areas have the highest dolphin densities and are connected with tributaries and swamps. These swamps present important fish spawning habitat and directly provides the fish stock for the dolphin area. Besides its importance for fisheries, these areas also have a great biodiversity and ecotourism potential for observing animals besides dolphins including several unique bird species, a.o. hornbills and lesser adjutants and mammals species, a.o. the endangered proboscis monkey, the near threatened long-tailed macaque, the silvered and maroon langur, the vulnerable smooth-coated otter, and the endemic Bornean monitor lizard (Budiono *et al.*, 2007).

Threats to the areas include: - Increased sedimentation rates by upstream logging, forest conversion and forest fires (especially peat swamp forest) both in the Mahakam as well as in the tributaries affecting fisheries; Coal-mining transport (from Gunung Bayan) through the narrow Kedang Pahu tributary resulting in accidental dump of coal (dust) dumped in the river during loading process and transport affecting fisheries and dolphins. Additionally, containerships often collide with the river banks thereby crushing underwater tree logs where many fish species spawn. Loud noise generated by the ships cause active avoidance by dolphins and disrupt daily migration patterns, boat collisions with speedboats in dolphin core areas, such as confluence areas; Coal-cleaning waste products, which reach the Kedang Pahu River through connecting channels, decrease the water quality and disturb the natural balance, which causes a decrease in fish abundance since some fish species are very sensitive to changes in water quality; A decrease of water quality is also caused by pesticides that are used within the large-scale oilpalm monoculture plantations; Overfishing through unsustainable and illegal fishing techniques (e.g., electro-fishing, poison); Aqua-culture that uses small fish from the river and gillnet fishing with very small mesh sizes causes a reduction of future breeding stock. Gillnets that are set up and span a considerable width of the increase the risk of dolphin entanglements.

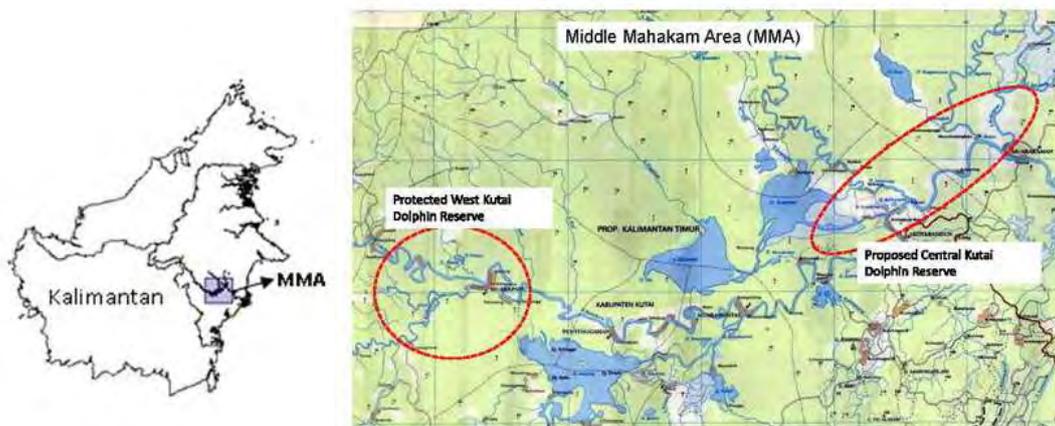


Figure 1. Proposed and protected dolphin areas in the Middle Mahakam Area in East Kalimantan, Indonesia

The project aims to establish community-supported dolphin and natural reserve areas, finalize regulations and establish a management body to increase its sustainability. It also attempts to educate the local community including younger generation on the importance of protection and sustainable use of natural resources. The project also aims to contribute to community development, through sustainable aqua-culture, which will also reduce the pressure on natural resources. Through the project activities, the protected areas have a greater chance of success in comparison to nature reserves, which have been established from „above“ and paid less attention to the communities“ needs. In the long term, we hope that wildlife, in particular freshwater dolphins, forest and fish spawning areas will become truly protected and that natural resources can be used in a sustainable way through guidance in combination with law enforcement.

EXECUTED PROJECT ACTIVITIES

1a) District Workshops in West Kutai (Sendawar and Muara Pahu)

The first district stakeholder meeting was held in Sendawar capital city of West Kutai district on the 6th of October 2010. Representatives from fifteen governmental and semi-governmental organizations, three companies, three non-governmental organizations and community representatives from seven villages were invited to the workshop.

In accordance to the schedule the workshop was divided in three sessions:

- 1) Focused presentations by the East Kalimantan Conservation Agency for Protection of Nature (BKSDA), West Kutai District Environment Department, Development Planning Agency of West Kutai, NGO RASI, NGO WWF. 2) Forum discussion under guided direction of a moderator to receive input for the draft management plan and the management body.
- 3) Conclusions and recommendations for further required coordination/ meetings to present the final management plan and management body.

The second workshop was held on the 9th of May 2011 in the sub-district Muara Pahu and intended only to obtain new information from the community and final input for the management plan. Both workshops hold the following objectives:

Workshop Goal and Objectives

- 1) To develop a scientifically justified and legally adopted management plan with all relevant stakeholders together for the dolphin protected area in Muara Pahu that incorporates communities“ aspirations and needs and provides efficient habitat protection through:
 - a) Implementing habitat quality improving measures by reducing chemical and noise pollution and reducing mortality risks caused by gillnet entanglement and vessel strikes.
 - b) Protection of fish resources through sustainable fishing methods and law enforcement of illegal fishing practices with the aim to protect prey resources of the Pesut Mahakam and sustain economic livelihoods of local fishing communities.
 - c) Riparian forest protection and rehabilitation within the protected area with the aim to reduce erosion and sedimentation, to protect fish spawning areas, fishery sources (tree seeds and fruits providing food for fishes), other protected species, and ecotourism potential.
 - d) Raising environmental awareness of local communities, government and other stakeholders for sustainable use of its natural environment and its resources and commitment for freshwater dolphin conservation
- 2) To establish task division among the stakeholders and appointment of the stakeholders management body that is incorporated in the management plan
- 3) Increasing the role and involvement of the private sector and community within the area protection and environmental friendly management and sustainable development and use of natural resources

Workshop Results

During the workshop discussions and through working papers and presentations (concept management plan by different organizations) that were submitted, direct input was obtained for improvement of the drafted management plan (Appendix 1 showing the draft after community input

was received) as well as for the further finalization process and the establishment of the management body. RASI organized the coordination process for finalization at the provincial level in Samarinda and shared the draft to three provincial organizations in Samarinda and incorporated their input after which the renewed draft was circulated to the governmental organizations in West Kutai and they are now internally working on a multiple years management planning. Community input was directly received during the workshop and prior to that within a series of community meetings and interviews. Final draft management plan with the stakeholders' task divisions and body was presented again during an internal meeting in West Kutai of the District Representatives and based on this the area now has been additionally assigned as strategic conservation area so that industrial development will be limited in the future with a focus on sustainable development.

The coordinative Environmental Department of West Kutai aims to have the management plan finalized and submitted to enter the national budgeting planning for 2011 onwards so that for all activities proposed funding can be directly proposed from national resources.

1b) District workshop in Kota Bangun, Central Kutai

A series of coordination meetings were held in with the most involved departments (Fisheries, Environment and Forestry) to propose a dolphin protected area in Central Kutai. Likewise, discussions with all heads and influential people in the villages in the protected areas as well as several interviews with fishermen were held to obtain their opinion on the proposed establishment. The response was unanimously positive and on the 9th of June 2011 a workshop meeting was held in Kota Bangun where all seven villages inside the proposed PA were invited and three additional villages in the bordering zone. The result was that all villages agreed upon establishment, which result will be forwarded to the regent of Central Kutai to issue a formal decree.

2) Socialization with local community prior/ after declaration of official protected area status in Central Kutai

Discussions with all heads and influential people in the villages in the protected areas as well as several interviews with 70 representative fishermen were held in March-May 2011 to obtain their opinion on the proposed establishment. At least 98 percent agreed upon establishment of a protected areas, whereas 2 percent would leave it up to the government to decide and follow that decree. The problems most fishermen were facing in their daily occupations were the reduction of fish resources, illegal fishing (using electro-fishing and trawl), pollution from oilpalm and coalmining industries, increasing water temperatures and sedimentation because of forest loss and unpredictable water fluctuations, so in short a decrease in economic prospects. Therefore, they hope that the PA will raise attention from the government to manage the area and its resources in a better way. The socialization on the protected status will take place after official declaration of protected area in Central Kutai. We anticipate that this may be achieved later this year.

3) Speed signboards installation

After the initial socialization with the communities inside the proposed PA in Central Kutai was done and after the workshop in June 2011 in mutual agreement with the communities signboards are being prepared and will be installed at the entrances of the narrow Pela tributary, which connects between Mahakam River and Semayang Lake as this is an important daily migration passage for the dolphins. The boards will be finalized after the formal decree by the regent has been issued so we can mention the number of the decree on the board.

4) Dolphin monitoring

Two extensive abundance monitoring surveys were conducted between 21 September and 30 September 2010 and 26 October and 4 November 2010 using photo-identification of dorsal fins for mark-recapture analysis. In addition, several interviews were conducted with fishermen daily to obtain new information on threats, mortality and distribution patterns. A summary of the results are presented here and a separate report submitted by the end of the project period.

Population abundance

The population of Irrawaddy dolphins in the Mahakam in 2010 was estimated at 87 individuals (CV=12%; 95% CL = 81-106), based on Petersen's mark re-capture analysis, which is similar to the numbers derived from the mark-recapture surveys conducted in 2007 (N= 87; CV=9%; 95% CL = 75-105) (Kreb, *et al.*, 2007). Total number of directly identified individuals in 2007 was 91, whereas the total number of dolphins directly identified in 2010 was 71 dolphins. This number is lower because of the fact that there were more surveys conducted in 2007 than in 2010.

The mean number of detected dead dolphins per year between 1995 and 2010 is 4 individuals (=4% of total population), whereas total number of recorded deaths is 68 dolphin in 16 years. Regression analysis showed that a significant decrease has occurred to the minimum detected annual mortality throughout the last years ($b = -0,27$, $df = 14$, $t = -2.3$, $p < 0.05$). If the period is divided into two periods, i.e. 1995-2002 and 2003-2010 the mean number of deaths decreases from 5 individuals (5% of population) to 3 deaths per year (3% of population).

Birth rates detected in 2000-2002 are 5-6 calves per year (5-6% of population), whereas the number of calves identified during one of the 2010 surveys also totalled 5 dolphins. In conclusion between 2005 and 2010 there have been no significant changes in population abundance but there have been significant changes in the core distribution areas of the dolphins (as described next).

Distribution

All sightings made of pesut during all surveys between 1997 and 2010 were confined to the area between Muara Kaman (± 180 km from the mouth) and Tering (± 420 km from the mouth) (Figure 2). Pesut has also been found in the tributaries in the middle Mahakam area, i.e. Kedang Rantau, Kedang Kepala, Belayan, Kedang Pahu, Pela, Semayang and Melintang Lakes; Pesut has also been found in between rapid streams at about 20 and 100 km upstream of the Ratah River, which mouths into the Mahakam at at least 500km upstream from the sea mouth. The maximum distribution area can seasonally extend beyond these areas both in downstream and upstream direction.

During population abundance monitoring surveys in 2007 we found that the population was more or less equally distributed in two districts Central and West Kutai, respectively 42 dan 52 individuals. Using photo-identification techniques we found that only three individuals were found in both (core) areas during previous surveys, whereas the rest of identified individuals were only found in (core) area during all previous surveys, which gives evidence that the groups of pesut generally remain in the same area. In 2007 an increase of groupsize of between 16-18 individuals was detected in the tributary Kedang Rantau near Muara Kaman, where before 2007 (1999-2002; 2005) only groups of maximum 6 individuals occurred.

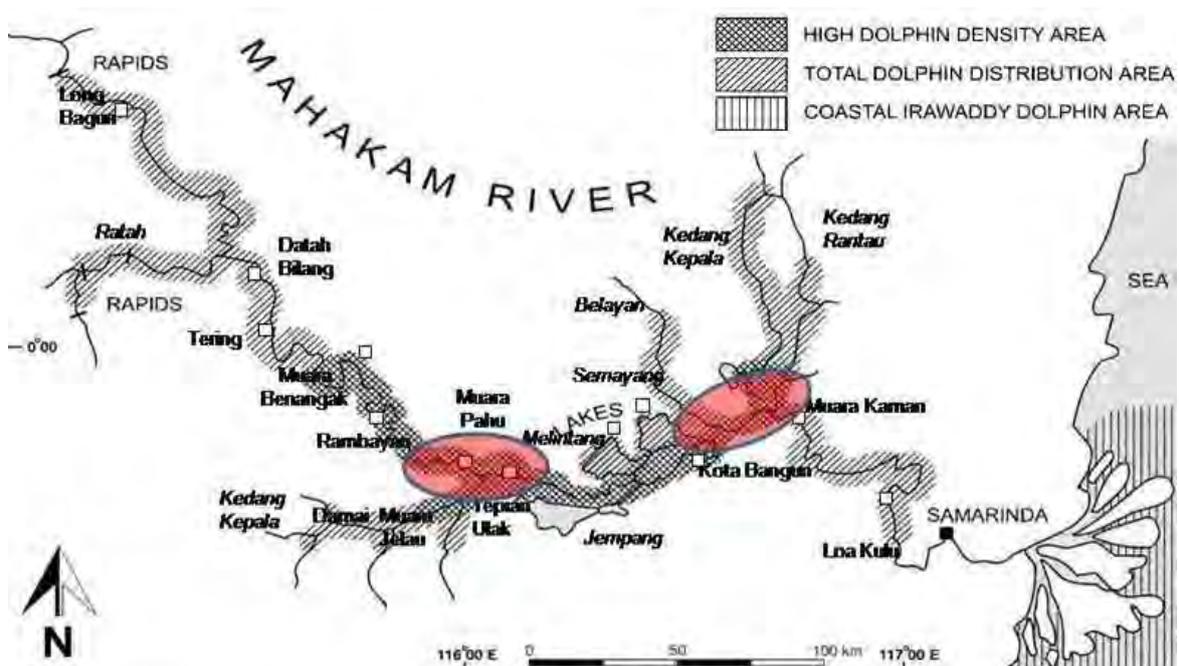


Figure 2. Distribution area of pesut. Dolphin core areas are indicated with red circles

Significant changes in dolphin distribution have occurred in time. Between 1999-2002 two cores have been identified where dolphins occurred in highest densities, i.e. the first core area of "Muara Pahu – Penyinggahan" in West Kutai, and the second core area of "Pela/Semayang – Muara Kaman" in Central Kutai. In 2005, 78% of the pesut population could be found in the first core area in West Kutai, but in the 2007 survey this percentage had been decreased until 57% and in two extensive monitoring surveys conducted in 2010 not one individual was found in West Kutai district area and the entire population was found in Central Kutai district. Although pesut may migrate during certain water conditions, this still does not provide a satisfactory explanation as before pesut could be found in West Kutai during any water condition, whether high, medium or low. Although based on reports dolphins still occur in West Kutai and Muara Pahu in particular, they can be less and less often observed by local residents and fishermen, whereas the dolphins since as long as they can remember have been very abundant in this core area. This is probably caused by the decreased habitat quality in the upstream areas and the decrease of fish resources in these areas.

The following developments have very likely contributed to the habitat degradation in the last recent years; i.e. the fast rate of conversion of swamps areas, that represent important fish spawning areas by oilpalm plantations, the coal-cleaning waste that enters into the Kedang Pahu River through small outlets and the underwater noise pollution caused by coal-carrying tugboats in the same narrow tributary, illegal use of electro-fishing and poison.

The most drastic changes have occurred in the core area of Muara Pahu where between 2002-2005 on average daily minimal 12 pesut (5-21 pesut) composed of 3 groups (2-6 dolphins/group) occurred for 42% of daylight hours (20%-65%) between 7:00-18:00 at any water level condition. At least 31 different individuals could be identified during 5 days consecutive land-based observations during every survey. With the increase of coal-carrying tugboat entering and passing through the Kedang Pahu River, pesut more often appears by the end of the afternoon or in the evening and in 2010 since fish spawning areas have been converted in oilpalm plantations, pesut are increasingly difficult to observe and also passing through the core area without spending much time in it.

Threats

Direct mortality

The major threat to Mahakam Irawaddy dolphins is direct mortality from gillnet entanglement (66% of deaths with known causes (N=68) documented through interviews and direct observations between 1995 and 2009 (Figures 4 & 5). The majority of dead dolphins were adults (74%), 14% were juveniles and 10% were newborn calves. Most dolphins died as a result of entanglement in gillnets with mesh sizes of 10 –17.5 cm. The close association of fishermen and dolphins increases the potential for entanglement. Dolphins are often observed feeding in close proximity to nets and many fishermen use the dolphins' feeding patterns as indicators of the location and time to set gillnets. Dolphins are reported to aid fishermen by guiding fish into their nets. In turn, fishermen reported that on several occasions they had successfully released dolphins from gillnets. But at least five dolphins accidentally killed in gillnets were eaten and the skin of two of them were used as skin allergy medicine.

Vessel strikes, all, except for one adult, involving juvenile dolphins, accounted for 10% of mortalities. Deliberate kills each accounted for 9% of the documented deaths, the latter occurring mostly in isolated areas where the dolphins were rarely found. Neonatal mortality involved 5% , whereas three percent of deaths occurred after being trapped in shallow water, and electro-fishing. Long-line fishing (*rawai*) and poison accounted each for 2% of deaths.

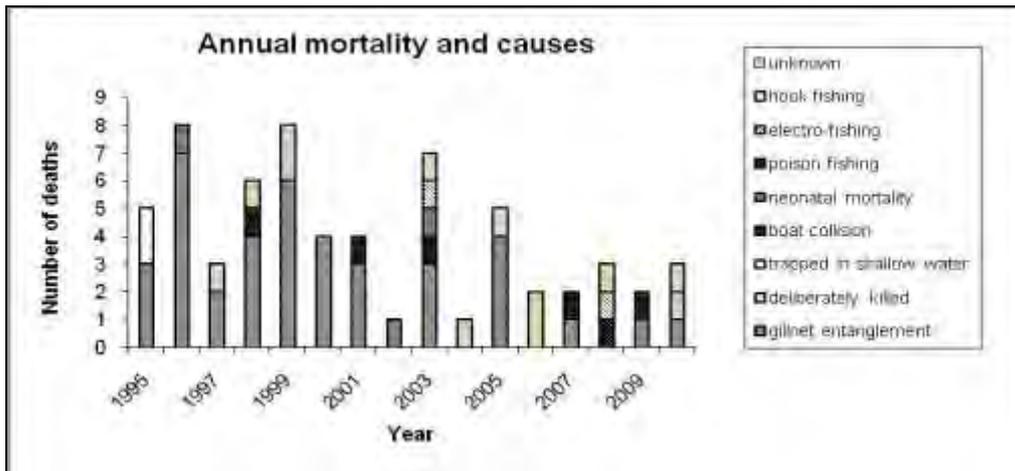


Figure 4. Minimum mortalities recorded through own observations and through reports and fishermen interviews

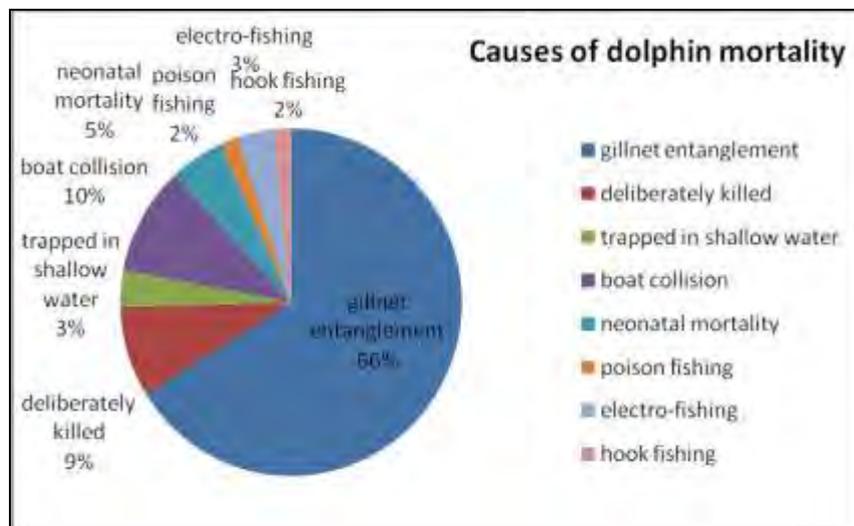


Figure 5. Causes of dolphin mortality

Factors that degrade dolphin habitat and thereby present an indirect threat to the animals include 1) sedimentation that is reducing the depth of lakes and reducing fish resources, 2) high frequency noise pollution generated by boat propellers and high decibel noise from tugboats and barges used for coal transport, 3) chemical pollution, mainly from coal and gold-cleaning waste, and 4) prey depletion from illegal and unsustainable fishing methods (electro-fishing, poison and trawl) and over-fishing to support unsustainable aqua-culture practices (breeding of fish that feed on other fish) . These are detailed below:

Sedimentation

A recent range decline involves the disappearance of the dolphin from Jempang Lake since the mid-1990's, probably due to a reduction in the depth of the lake from sedimentation caused by deforestation of the watershed. High densities of gillnets and sedimentation have also restricted the possibility of movements into the other two lakes, Melintang and Semayang. Except during high water levels dolphins are now confined to a narrow boat channel between the lakes where there is a high risk of vessel collision and noise pollution impacts. Besides, sedimentation is decreasing the fish resources (see *prey depletion*)

Noise pollution

The main source of noise pollution is high-speed vessels (40-200 hp) (mean = 4.6 boats/ h in dolphin habitat). Dolphins dive for significantly longer periods when the boats are within 300 m of them (Kreb & Rahadi, 2004). In addition, frequent passing of fast moving motorized canoes with long propeller sticks (max 26 hp) also caused dolphins in the Pela River to dive longer. Container barges pass daily (mean = 8.4 boats per day) through primary dolphin habitat on the Kedang Pahu River, a narrow tributary of the Mahakam. These vessels take up over two-thirds of the width of the river and over half the depth of the tributary during the dry season. Dolphins always changed their direction (if swimming upstream) when they encountered loaded container barges. During low water periods they actively avoided the tributary, whereas before the presence of container barges dolphins entered the tributary while moving upstream to the Bolowan confluence (c. 10 km from the Kedang Pahu mouth) at all water levels according to information from local fishermen. A new type of self-propelled oceanic carrier ship is now also being used to carry coal directly from the mining company at Muara Bunyut (near Melak). This raises considerable concern about the tremendous amount of underwater noise pollution produced by these ships in such a restricted water body, as well as the effect of these ships in increasing the channelization of the river bed.

Chemical pollution

Mercury and cyanide are introduced into the river from leaks in dams that retain wastes from large-scale gold mining operations and from small-scale illegal operations operating along the river. Accidental dumping of coal dust occurs frequently and this may have caused changes in the skin pigment of dolphins in this area observed in 2002 and 2007. In other areas such pigmentation changes have never been observed. In addition, coal cleaning waste enters the larger tributaries and lakes through the connecting narrow streams at high water periods. Pesticides from oilpalm plantations along river systems also form an unmonitored threat.

Prey depletion

Intensive fishing with gillnets, electricity, trawls (especially in the lakes), poison (Dupon/Lamet, Deses, Gadong's root) and aqua-culture of fish that are being fed with small fishes, which are directly caught from the lakes or river, has probably contributed to the significant decline of natural fish resources (Fisheries Department, 2007). This prey depletion may also be affecting the time and energy the dolphins have to spend finding prey. Logging of riparian forest also reduces fish resources. It increases water temperature and sedimentation and reduces the amount of detritus, which is food for fish. Decreased fish densities may increase dolphin presence at gillnets. Conversion of swamp forests to oil palm concessions, a widespread practice in the region, also severely reduces fish spawning areas.

5) Sustainable aqua-culture fisheries

In September 2010, 14 fishermen (10 fishermen for initial round and 5 after the money for the cages has been returned by the first-round fishermen) were pre-selected in coordination and discussion with a local senior fishermen and aqua-culture specialist that was appointed by RASI as local supervisor of the project and who is well aware of the socio-economic situation of the fishermen (Appendix 4). The fishermen were selected based on the following criteria: 1) low income and dependent on direct fishing, especially those previously involved in gillnetting or destructive fishing such as electro-fishing (but willing to change their habits and improve their livelihoods, see conditions set by RASI below), 2) Readiness to look after the fish cages and one or two of the selected fish species, 3) Readiness to return the cash for fish cages within the time set (1.5 years), 4) two fishermen were allowed to participate although they already had a fish cage with piscivorous fish, that is being fed with fishes from the river, but agreed to change fish species that can be fed on pellets and vegetables instead of other fish after they received aid to culture more ecologically sustainable fish species.

In addition, RASI set five conditions in the contract that obliges the fishermen to engage in sustainable fisheries including: 1) Limited use of gillnets of minimal 5cm and maximal 10 cm mesh size, 2) gillnets may not be set overnight, 3) during daytime setting, gillnets need to be checked at least 3 times per day, 4) no use of poison, electricity or trawling to catch fish, 5) fish to be cultivated in the cages during contract period only include the non-piscivorous fish species: Mas, Jelawat, Nila, 6) food to give to the fish in the cages exclude fish caught from the wild (river, lake or swamp).

Contracts were signed with ten fishermen upon receiving of 2 fish cages, 900 juvenile fish and 70kg pellets each. Cages, pellets and fish brood have been purchased already and standby in Pela. The fishes have initially been raised since 3 weeks ago from today in cages with special small net mazes to prevent strong currents to improve their chances of survival when they would be released in the project fishermen" floating fish cages, which was done mid February. Because the stock is so low RASI wants to set up it its own breeding facilities in collaboration with the local community so they can provide their own breeding stock and do not depend on the limited and expensive fish stock in downstream area of Loa Kulu. The first harvest was successful and on average 85 % (75%-95%) of the 900 fishes provided to each project fishermen survived until harvest. Each fisherman produced on average 260 kg with a price of 20.000 Rupiah per kg obtaining a total price of 5.200.000 Rupiah. All fishermen now wait for new fish stock since the supply is not always available. When the new juvenile fish the new pellets will be purchased and will be reduced from the total price above, the net benefit for each fisherman is between 1.6 million and 2 million rupiah per set. If they would expand with another set of aqua-culture cages then the monthly benefits would be enough to sustain their livelihoods.

6) Environmental education of the younger generation

In order to educate the younger generation that share the same habitat with the freshwater dolphins on the importance of conservation and sustainable resources use, RASI organized the "Pesut Mahakam Conservation Education Campaign 2011", which was held in primary Schools in the Middle Mahakam Area between 24 - 31 January 2011. Prior to this campaign a one-day campaign was also organized at an elementary school in Samarinda in November 2010 to celebrate the establishment of the 24th October as international freshwater dolphin day and to test the presentation material if it would be interesting and appealing for the elementary students.

Objectives

1. Knowing the response of teachers and elementary school students to conservation of natural resources and to increase the knowledge of the younger generation about the condition of the natural resources of East Kalimantan.
2. Building a caring attitude towards conservation in general amongst elementary school students.
3. Introduce Pesut Mahakam and its current status and develop a caring attitude of students towards conservation of the Pesut Mahakam.
4. Encouraging young people to take active part in environmental conservation activities, especially related to saving the Pesut Mahakam and its habitat.

Campaign tools & preparation

Prior to execution of the elementary campaign, every school was visited to coordinate the schedule for the activities. After fixing the schedule, the following campaign tools were prepared:

- The preparation of campaign materials in the form of powerpoint presentations for elementary school. Presentations focused on the introduction Mahakam Dolphin and effort to conserve and related to the results of research conducted in 2010. The powerpoint incorporated many funny images besides being informative to captivate the imagination and enthusiasm of the kids, a short drama role play about the legend of the pesut that would be played by two selected kids, a short cartoon movie of the pesut and a song text about the dolphins that could be sung together
- Conducting the process of editing a documentary film about "Dolphins" with a duration of 15 minutes with Indonesian text for broadcasting in schools to be played during drawing competition evaluation time.
- Key ring / pin representing the Mahakam Dolphin.
- Knowledge books about dolphins and whales.

Campaign results

- The campaign was conducted between 24 – 31 January 2011 at 11 public elementary school in Muara Pahu and Penyinggahan sub-district (West Kutai District) and Muara Muntai, Kota Bangun (Pela and Liang) and Muara Kaman sub-district (Central Kutai District). The campaign was attended by 38 teachers and 580 students.
- The campaign began with presentations on the general introduction of Pesut Mahakam and conservation efforts. During the presentations, participants were asked a few questions, and for those students who could answer these questions correctly a gift such as key chains (pin) were given. After the campaign had finished, activities continued with singing together. The song used was a national children's song, of which the lyrics of song were changed in accordance with the theme of the campaign (Pesut Mahakam). Singing activity was also accompanied by the strains of a guitar sound that was played by Patrick Yeung Chung, a volunteer from Hong Kong. At the end of the campaign a drawing competition with the theme "Pesut Mahakam and the Environment" was held or a written test for schools to remind students who forgot to bring drawing tools. The purpose of the written test was to determine the extent of absorption of received a prize of a book about dolphins and whales.
- During the campaign activities, students and teachers participated very vibrant and very enthusiastic (see *Pictures*). The students were very eager to answer any questions given during the presentation and actively participated in the drama role play, songs and competition. All schools showed an excellent response to all activities. The teachers expressed their hope that these activities can be carried out continuously, at a minimum once a year.
- In addition to the need for sustainable implementation of the campaign, the school is hoping that the existing environmental education books, of which several copies were provided in 2009 for schools, can be added or multiplied. Teachers hope that in the future these books can be included in the regular course module for their schools.

Conclusions and recommendations

- A very good response was shown by the student participants towards the campaign activities. This is shown by the number of schoolchildren who could answer the questions, which were given by the presenter.
- The knowledge from schoolchildren regarding conservation efforts of the natural environment and natural resources including pesut Mahakam was increased. This improvement was especially related to protecting Pesut Mahakam and other rare aquatic species along Mahakam River from extinction.
- Students' knowledge about the location of the Mahakam dolphin habitat was increased and the students were already aware of the threats that endangered the pesut. Most schoolchildren know that it is very important prevent this symbol of East Kalimantan from extinction.

- There is a need for increased information resources, especially formal environmental education books or other information sources about natural resources especially the pesut Mahakam.
- It is necessary to continue campaigns in order to increase awareness from all society members and to show them how and why the natural resources must be conserved.
- The government including the education department needs to take an active role to cultivate awareness and care for conservation of natural resources in general.

7) Water quality sampling in the protected dolphin area of Muara Pahu

Since September 2010, monthly water samples are being collected in the PA of Muara Pahu to check for the water quality, because of the close vicinity of oil palm and coalmining activities, which are considered to impact on the water quality in this area. The 30 samples are still being analyzed but results are expected in first week of July 2011 and will be incorporated in a new updated version of this report that is expected ready by mid July 2011.

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Appendix 1. Draft Management Plan and Task Division for the Protected Nature Reserve of Muara Pahu (KPA) – Kawasan Pelestarian Alam (KPA) Muara Pahu*

*This is only part of the management plan; background objectives etc are not shown here as it is in Indonesian and therefore we just present the essential part here.

- *Management of the Protected Nature Reserve of Muara Pahu (PA) – Kawasan Pelestarian Alam (KPA) Muara Pahu*
 - 1) Develop and legalize regulations and binding policies regarding habitat protection within the PA in Muara Pahu sub-district, West Kutai.
West Kutai Government (Fisheries, Environment, Mining, Transport, Forestry, Public Works, Tourism), East Kalimantan Nature Conservation Agency (BKSDA), Coal-mining and Oilpalm Industries, Community representatives and NGOs YK-RASI and WWF
 - 2) Establish a management body of collaborative stakeholders (incl. community, government, NGOs, companies) that meet on a regular basis to discuss problems and provide updated information and for coordinated action. Within this body establish an executive field unit for routine tasks.
West Kutai Government, BKSDA, Coal-mining and Oilpalm Industries, Community Representatives and NGOs YK-RASI and WWF
 - 3) Having base funding yearly made available by the government for implementation of policies and regulations. Also, part of Corporate Social Responsibility Funds from the private sector should be allocated for environmental improving measures.
All relevant departments apply for National Funds to be able to conduct their tasks; Coal-mining and Oilpalm Industries (community development funds)
 - 4) Socializing with the communities and companies within the PA about the protected area status, its regulations and policies through small meetings.
West Kutai Government, Community representatives, Coal-mining and Oilpalm Industries and NGOs YK-RASI and WWF
 - 5) Mapping and demarcation of PA boundaries in Tepian Ulak, Rambayan, Muara Pahu, Muara Jelau
Department of Environment and District Planning and Developing Body in West Kutai, NGOs YK-RASI and WWF
 - 6) Installing information boards about the PA and its regulations in the areas of Tepian Ulak, Rambayan, Muara Pahu, Kedang Pahu (at Jelau confluence) and Bolowan Rivers.
BKSDA, Muara Pahu Municipality, Public Transport Department West Kutai and NGOs YK-RASI and WWF
- *Public Transport*
 - 1) Providing and enforcing regulations for coal-transport (a ban of coal-barge transport in tributaries (Kedang Pahu within PA) and a ban on oceanic coal-tanker ships in the Mahakam)
Department of Environment and Mining, Public Transport Department West Kutai.
 - 2) Installing information boards indicating a speed limit for boats (max.15 km/hr), 500m before entering the confluence area of Muara Pahu both up and downstream and in the Kedang Pahu KPA entrances at Muara Pahu and Jelau River.
Muara Pahu Municipality, Public Transport Department West Kutai and NGOs YK-RASI and WWF
- *Fisheries*
 - 1) Regular patrol for illegal fishing tools (batteries, trawl and poison) in a random but frequent manner and application of law enforcement together with socialization of regulations

West Kutai Fisheries Department and Muara Pahu Police Department

- 2) Establishment of Fish Reserves within the KPA.

West Kutai Fisheries Department

- 3) Placing clear signboards with fisheries regulations or to indicate fish reserves.

West Kutai Fisheries Department

- 4) Conducting education awareness campaigns targeting at fishermen for a sustainable use of fish resources.

West Kutai Fisheries Department

- 5) Enable local fishing communities to engage in sustainable fisheries (such as aqua-culture using non-piscivorous fish, which is not derived from the river and which can be fed on a combination of pellets and vegetables such as Jelawat, Mas or Nila Fish) to reduce pressure on natural fish resources. Furthermore while aid for aqua-culture is being provided the following policy should be followed:

- a) Since initial investment may be too costly for fishermen, it is recommended that the Fisheries Department and Department of Community Development will support requests for low interest loans to overcome initial pre-harvest expenses and that need to be paid back after a period of at least one to two years to allow for income generation after several successful harvesting.

- b) Only non-piscivorous fish is being provided

- c) Careful selection of fishermen that are most in need of support,

- d) While providing aid, technical assistance also needs to be provided and regular monitoring

Fisheries Department, Department of Community Development, NGOs and Companies

- 6) Training local fishermen to set up healthy breeding strains to reduce the costs of buying strains from other areas, in particular Jelawat and Mas Fish,

West Kutai Fisheries Department, NGOs

- 7) Training local women to produce nutritious, high-quality fish pellets, to guarantee quality and reduce costs of purchase and increase women involvement in production sector,

West Kutai Fisheries Department, UNMUL

- 8) Providing assistance and promoting fish chips production and marketing from sustainably bred fish as an innovative and sustainable product from the Mahakam River,

West Kutai Fisheries Department

- 9) Developing presto (high-pressure steamed and vacuum packed) fish products from Mas Fish to increase local incomes from sustainable fish breeding. Currently, this kind of product, for which there is a great demand, only uses Bandeng Fish, which is being produced in fish ponds in converted mangrove areas and sold in larger cities. But some initial experiments indicated that riverine Mas Fish is even more tastier and has a high potential for the market

West Kutai Fisheries Department, UNMUL

• *Forestry*

- 1) Preventing illegal logging activities through regular patrols and (re-) evaluation of permits for sawmill and moulding enterprises within KPA.

BKSDA, Forestry Department, Muara Pahu Municipality

- 2) Habitat rehabilitation including riparian reforestation in the PA while community landowners may be aided with tree seedlings for tree species, which fruits or other products (rattan, gaharu) can be harvested.

Forestry Department

- 3) Allocation of Corporate Social Responsibility should be allocated to environmental improving measures such as agro-forestry in order to create bufferzones and aid communities in sustainable resources use.

Forestry Department, Muara Pahu Municipality, Private sectors (coalmining and oilpalm companies)

- 4) Restoration of the ecological function of swamp areas as fish spawning areas that have been converted for oilpalm plantations

Forestry Department, Agriculture Department, Muara Pahu Municipality, Private sector (oilpalm companies)

- *Agriculture*
Socializing oilpalm companies to use more environmental friendly practices and/or apply the Roundtable on Sustainable Palm Oil Certification procedure
Agriculture Department, WWF Indonesia
- *Ecotourism*
 - 1) Promoting the KPA Muara Pahu as an (inter)national eco-tourism destination.
Tourism Department, NGOs YK-RASI and WWF
 - 2) Building eco-tourism infra-structure
Tourism Department, Public Works
- *Education*
 - 1) Providing environmental education courses at elementary and junior high schools, which are scheduled and are part of the local curriculum.
Education Department, YK-RASI, WWF
- *Monitoring*
 - 1) Establishing a monitoring system for chemical waste products disposal by companies and monthly monitoring of water quality in the PA in West Kutai.
Department of Environment, Local Community, University of Mulawarman (UNMUL), NGOs YK-RASI and WWF
 - 2) Monitoring of Pesut Mahakam population. Bi-annual abundance monitoring of entire Mahakam population and weekly monitoring of dolphin occurrence by using trained, local patrol teams.
YK-RASI, Local Community and BKSDA
 - 3) Investigation of levels of erosion and sedimentation of forest trips and the Mahakam River system in West Kutai.
West Kutai District Government, UNMUL and NGOs YK-RASI and WWF
 - 4) Study assessment of social-economic development of fishermen in the KPA Muara Pahu.
YK-RASI, WWF and UNMUL
 - 5) Participatory community study to map and re-enforce/ establish fish reserves
Fisheries Department, NGOs, Local Community
 - 6) Development of rattan gardens and marketing
Forestry Department

Draft regulations and policies that apply within KPA Muara Pahu:

- *Management of the Protected Nature Reserve of Muara Pahu (PA) – Kawasan Pelestarian Alam (KPA) Muara Pahu*
 - 1) Establishing and legalizing a multiple stakeholder management body
 - 2) Socialization of PA boundaries, regulation and prevailing policies in the Muara Pahu PA to all layers of local society and private sector
- *Forestry*
 - 1) Demarcation of KPA Muara Pahu in Tepian Ulak, Rambayan, Muara Pahu, Kedang Pahu (at Jelau confluence) and Bolowan Rivers.
 - 2) Riparian forest protection with minimal 150m strip width from each bank within the KPA. For areas that are already in use for agriculture by individual owners in collaboration and mutual agreement these people may be aided with tree seedlings for tree species, which fruits or other products (rattan, gaharu) can be harvested.
 - 3) No new permits for sawmills or mouldings along the river banks within the KPA.

- 4) Especially for Bolowan River no logging activities within a 500m forest strip in the area between Bolowan River bank and Mahakam River bank to protect the proboscis monkey population, fish resources and ecotourism potential.
 - 5) Especially for Jintan/ Abit, no logging activities of (peat) swamp forest for protection of fish resources and ecotourism potential. Preservation of the peat swamp forest north of Jintan and the lakes, which has a high biodiversity potential as well as for scientific studies and ecotourism.
- *Fisheries*
 - 1) No use of electro-fishing, trawl and poison for fishing in the PA Mahakam River and Kedang Pahu section
 - 2) Strict application of a minimal mesh size (3.8 cm) regulations for gillnets to prevent capture of juvenile fish
 - 3) Recommending a maximum mesh size (< 10 cm) in the Mahakam River and Kedang Pahu River to prevent capture of adult spawning fish and dolphin entanglement (through entanglement of parts of fluke or fins).
 - 4) Recommending gillnets to be set not exceeding 15 meter perpendicular from the riverbank.
 - 5) No night time setting of gillnets in the river sections of the PA except for gillnets of mesh size 3.8-5 cm.
 - 6) Recommending gillnets to be set near the village in sight of people or owner and if set further away nets should be attended by the owner applying to river sections of the PA.
 - 7) If a fisherman is willing to cut its gillnet and release a dolphin alive, he may receive a financial compensation if he reports to the local fisheries department and has prove of the cut net.
 - 8) Helping fishermen to engage in sustainable fishing techniques
 - *Agriculture*
 - 1) Ban for oilpalm industries to converse fish spawning areas in swamps
 - 2) Ban for oilpalm industries to set up dams in swamps for flood prevention that will prevent fish from entering these spawns to spawn and in case they do enter during high flood, they are unable to leave the area again
 - *Public Transport*
 - 1) Coal-carrying container ships are not allowed to pass through the Kedang Pahu River.
 - 2) Installing information boards with a maximum speed limit of 15 km/ hr, at 500m entrances before the Muara Pahu confluences up- and downstream, and Mahakam and Jelau confluences of the Kedang Pahu River.
 - *All sectors including NGOs and education/ research institutes*
 - 1) Establishing a management authority for the Protected Area of Muara Pahu including establishment of patrolling teams
 - 2) Socialization with local communities and companies about the protected area, its regulations and policies
 - 3) Water quality control system and develop regulations for storage of coal cleaning waste product and fertilizers/ pesticides use by oilpalm industries.

Appendix 2. List of fishermen from Pela village selected by RASI to participate in the project.

NB. For the second round fishermen, there should be still one fishermen added because it is 1.5 years away and these names can still alter as we need to re-confirm their participation by that time.

	1 st round fishermen		Tentative 2nd round fishermen
1	Sura	11	Solihin (b)
2	Syahrudin	12	Jufrun
3	Suri	13	Asmadi
4	Solihin (a)	14	Fahrudin
5	Jamanudin		
6	Alimudin		
7	Saripudin		
8	Yadi		
9	Yayan		
10	Hendra		

Appendix 3. Pictures

District Workshop Sendawar, 6th of October 2010



Presentation by Yayasan Konservasi RASI highlighting the current situation for the dolphins in the PA and the threats



Discussions to receive input on the management plan and stakeholders body was directed under the guidance of the moderators



After the workshop closure a picture was taken with part of the participants

Community workshop in sub-district Muara Pahu, 9th of May 2011



Community workshop in the second proposed dolphin PA, Kota Bangun 9th of June 2011



Dolphin monitoring



The Mahakam main river between 180km-500km from the mouth was surveyed including several major tributaries



Typical surfacing pattern



Less usual surfacing pattern usually associated with play and fast swim



Enough time was spent with each dolphin group to obtain enough dorsal fin pictures



The front observer scanned the river during 30 minutes continuously using hand-held binoculars. In addition there was one additional front observer scanning with the unaided eye while recording data, and one rear observer was positioned, which was necessary to detect dolphins that could possibly remain undetected after sharp bends.



Semayang Lake still forms an important habitat for the dolphins and they make daily migrations between the main river and the lake through the Pela River, where a sustainable aqua-culture project has started.

Sustainable aqua-culture fisheries



Project socialization and discussions with the appointed local supervisor Pak Alul (picture above, 2nd from right) with RASI's director Budiono (picture above, right) and with local interested fishermen from Pela village prior to selection



Juvenile Mas fishes, *Cyprinus carpio*, which are being raised first in special cages with nets inside to prevent strong currents before they are distributed to the project fishermen's cages.



The fishes are fed entirely on pellets and vegetables



Project cages



Three week old project fish after introduction in project cage.



Three-month old project fish, nearly ready for harvest.



Official distribution of fish cage to one of the project fishermen by the local supervisor

Socialization with local community prior to PA establishment in Central Kutai through interviews



At least 98 percent of the fishermen agreed upon establishment of a PA because they are all facing reduced income from direct fishing (picture above) because of decreasing fish resources through pollution and sedimentation and illegal fishing techniques such as electro-fishing and trawl.

Elementary school campaign



Conducting the presentation with pupils from elementary school SDN01 and SD02 in Muara Pahu



The pupils showed active and enthusiastic responses to questions asked (SDN 03 Muara Pahu)



The pupils were asked to join in a role play telling the legend of the origin of the pesut Mahakam



Teacher and pupils singing a song about the Pesut Mahakam



Patrick, a volunteer from Hongkong is guiding the pupils during the song



All pupils were very eager to join the drawing completion at the end of the campaign



The winners of the drawing competition



The campaign team, pupils and teachers posing together at each school after the campaign

Water quality sampling



Each month at seven fixed locations routine sampling was performed and water quality samples taken.



All sampling data were recorded on datasheets.

Speed sign boards in Pela Tributary



Draft sign boards that will be finalized and installed as soon as the official decree from the regent of Central Kutai will be effective. Pela tributary is a narrow daily migration passage for the dolphins between the Mahakam and Semayang Lake and many vessels are moving at high speed.