



# SAFETY AT SEA ASSESSMENT IN THE TIMOR-LESTE SMALL-SCALE FISHERIES SECTOR

## Technical report

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National Directorate of Fisheries and Aquaculture  
**Ministry of Agriculture and Fisheries**  
Regional Fisheries Livelihoods Programme for South and Southeast Asia  
**Timor-Leste**



**REGIONAL FISHERIES LIVELIHOODS PROGRAMME  
FOR SOUTH AND SOUTHEAST ASIA (RFLP)**

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**SAFETY AT SEA ASSESSMENT IN THE TIMOR-  
LESTE SMALL-SCALE FISHERIES SECTOR  
TECHNICAL REPORT  
(Activity Code: 2.1.1 & 2.1.2 Work plan 2011)**

**For the Regional Fisheries Livelihoods Programme for South and Southeast Asia**

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## EXECUTIVE SUMMARY

This report contains an assessment of certain safety-related issues in Timor-Leste's small-scale fishing sector. Based on RFLP experience and the current data available on the fisheries sector in the country, the report is intended to provide a set of recommendations for the further development of national policy and legal frameworks to enhance the safety of small-scale fishers.

The first section provides an analysis of the current legal framework for safety at sea with a strong focus on the small-scale fishing sector. From previous surveys and the assessment undertaken, it is apparent that the implementation of the current fishing-related legal provisions cannot easily be met. Beyond the limitations in human capital and resources for enforcement, the imported nature of the legal framework hinders its implementation in the country. The second part of this report contains the results of a vessel assessment conducted in Timor-Leste in 2011. The purpose was to compare the current alternatives in boat construction and building and to assess the suitability of current policies aimed at the introduction of fibre-glass boats. The boat assessment was a first step towards a better understanding of the current safety at sea situation in Timor-Leste and provides input on how to move forward in order to promote safer vessels for fishers, taking into account the current constraints for materials and skills in the country. The third section of the report gives the initial findings from the first year of operation of the accident reporting system established by RFLP.

In addition, this report summarizes some of the suggestions and recommendations that have been integrated into different training courses and awareness activities delivered to fisher groups. These include those who received fishing boats from the government to whom RFLP provided advice on how to improve the stability of the boats which they had received. RFLP also held informal meetings with boat builders to discuss how to improve the quality, durability and safety of the boats they construct. Finally, this document provides specific policy recommendations for the NDFA, which are based on the results of the assessments and on RFLP experience.

## SUMMARY OF RECOMMENDATIONS

### *For the legal provisions on safety at sea*

1. Timor-Leste should consider setting up its own Flag State with the International Maritime Organization (IMO) as soon as possible. Timor-Leste also needs to select quality inspection bodies.
2. The inspection body for shipbuilding should be established under the umbrella of an inter-ministerial body which at least should include both the Port Authority and the Directorate of Fisheries as members. Coordination between the NDFA and the Port Authority should be ensured.
3. Inspection of fishing boats should continue to be the responsibility of the Department of Fishing Inspection of the NDFA. In this regard, specific capacity building for the Department staff should be provided in the near future.
4. Minimum technical requirements for the issuance of certificates as well as for the development of designs should be established and approved. The Timor-Leste Fisheries Technical School project should

address the lack of institutions able to provide the required certificates and integrate them into their curriculum.

5. The procedures established by law for the issuance of fishing licenses should be revised and simplified.

6. The classification of the fleet should be simplified to ensure that all vessel types within the fleet are defined and safety at sea regulations apply to them. Boat categories should be classified by a simple set of criteria.

7. Appropriate vocational training courses should be delivered for skippers and boat operators to improve safety at sea. The establishment of the Technical School can provide a proper platform for this.

8. Specific equipment can be required for the operation of small-scale vessels. If specific legislation on safety at sea for small-scale fishing vessels is developed, the infrastructure and budget limitations of the NDFA, the constraints of fishers to purchase equipment and other characteristics such as boat capacity should be taken into account.

9. While awareness raising should be conducted for divers on the safety measures to avoid the highest risks during fishing, specific regulations such as the setting up of the minimum distance between divers during operations should be withdrawn. Resources, number of staff and budget available make the enforcement of this kind of provision almost impossible. In addition this type of regulation can be used as a mean of abuse by the authorities against resource users.

10. The introduction of the RFLP promoted Community Based IUU reporting system using SPOT® should become regularized as a national policy on IUU.

11. The formalization of the IUU Community Based IUU reporting system should be accompanied by the creation of a body to respond to calls for help and reports of illegal fishing activities sent by fishers using the reporting devices. This National Maritime Security Committee should be composed by all Ministries involved in maritime related matters.

12. More awareness raising on current fisheries regulations should be carried out through the already established *Mobile dissemination of fisheries laws* process. Dissemination of laws should be simple and adapted to the needs and capacity of the audience.

13. More emphasis should be given to improving the capacity of the NDFA staff to appropriately interpret the law. This emphasis should take into account the language constraints.

14. Development of new laws and or revision of the legal framework must not be considered an aim in itself. Imported legal provisions should be avoided and a specific legal framework in line with the needs and structure of the small-scale sector should be developed. The absence of law can be more beneficial than the implementation of inaccurate laws, as they can facilitate power abuse.

15. More emphasis should be given to enhance the capacity of specifically fisheries planners and managers as well as in producing materials which incorporate a better understanding of the law. However, it is highly necessary to have input from a legal advisor to provide on-the-job support and mentoring for NDFA staff on a daily basis.

***For boat assessment***

16. The donation of free boats is strongly discouraged. Approaches involving the users as co-responsible of the sustainable development of the sector and no mere recipients should be pursued.
17. Any policy aimed at renewing the fishing fleet should involve all the government and non-government actors involved in the sector.
18. The newly established Banco Nacional de Timor Leste provides a good opportunity to develop a special loan scheme for fishers in order to establish a *Programme for the development of the fisheries sector*.
19. In order to improve the working conditions of fishers a *Programme for the renovation of the fleet* could be set up which withdraws unsafe boats operative in country.
20. The already piloted *Accident at sea recovery programme*, should be continued.
21. The three programme schemes mentioned above, namely the *Programme for the development of the fisheries sector*, the *Programme for the renovation of the fleet* and the *Accident at sea recovery programme* could constitute three lines of action under the umbrella of the *Fund for the development of the small scale fisheries*, regulated under the current law.
22. If fishing boats are to be supplied under any of the above mentioned programme schemes that are developed by appropriate relevant institutions, it should be considered that a) A technical body should be established to assess the boats which are to be promoted, b).specific beneficiary selection criteria should be established and agreed, and c) beneficiaries should sign a contract to contribute data on fish catch and other information as required by the NDFA.
23. In developing more programmes aimed at the introduction of fibre-glass, it should be noted that currently fishers cannot afford to purchase fibre-glass boats. In this regard: a) the forestry policy should be reconsidered in order to accommodate the needs and possibilities of fishing families; b) it is recommended that support is given to regular maintenance of wooden fishing vessels.

***Other safety at sea matters***

24. A national awareness raising campaign on safety at sea related matters should be conducted.
25. Specific awareness rising campaigns on diving-related risks should be continued.
26. Specific training courses should be designed for boat builders in order for them to provide information on the loading capacity of the boats.
27. Specific awareness raising should be carried out to encourage boat users to practice regular maintenance of their fishing boats.
28. Training courses on engine maintenance and repair should be continued beyond the RFLP period. Specific
29. The majority of accidents at sea are caused by saltwater crocodile attack which are regarded as sacred beings (*lulik*). A) Inter-disciplinary research should be done. B) Any action to mitigate crocodile attack should be culturally sensitive. C)Any kind of coastal livelihoods likely to stimulate relocation of people to areas near lakes or mangroves are strongly discouraged.

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## TABLE OF ACRONYMS

<b>DFO</b>	District fisheries officers
<b>EEZ</b>	Exclusive economic zone
<b>FAO</b>	Food and Agriculture Organization
<b>IMO</b>	International Maritime Organization
<b>ISO</b>	International Organization for Standardization
<b>MAF</b>	Ministry of Agriculture and Fisheries
<b>NDFFA</b>	National Directorate of Fisheries and Aquaculture
<b>NGO</b>	Non Governmental Organization
<b>PSC</b>	Port State Control
<b>RFLP</b>	Regional Fisheries Livelihoods Programme
<b>TL</b>	Timor-Leste



# 1. INTRODUCTION

The Regional Fisheries Livelihoods Programme for South and Southeast Asia (RFLP) sets out to strengthen capacity among participating small-scale fishing communities and their supporting institutions in Cambodia, Indonesia, the Philippines, Sri Lanka, Timor-Leste and Viet Nam. By doing so, the RFLP seeks to improve the livelihoods of fishers and their families while fostering more sustainable fisheries resources management practices.

Within the framework of RFLP Timor-Leste, a safety at sea assessment was planned in 2010-2011 under RFLP Output 2, aimed at improving safety at sea and reducing the vulnerabilities of fishing communities. Beyond the RFLP Baseline Survey results on safety at sea (AMSAT Int., 2011), which are based on respondents' answers, it was considered appropriate to carry out a further evaluation of the current safety at sea conditions from a technical perspective. Several objectives were pursued: first of all, to identify gaps and opportunities in the current fisheries legal framework on safety at sea for small-scale fishers; second, to document and report on the practices of construction and maintenance of boats in Timor-Leste, and third to present the results of the first year of operation of the accident reporting system set up by the RFLP as part of the National Fisheries Statistical System. The results of the present assessment are based on primary data gathered by the NDFA-RFLP from 2010 onwards, as well as on the experiences of activity implementation of the RFLP.

The first part of the paper is focused on the legal provisions under the Timor-Leste fisheries laws. Based on an analysis of the law and the knowledge gained on the Timor-Leste fisheries sector, some policy recommendations are provided. The second part summarizes the results of a boat assessment conducted by the RFLP as part of its regular programme. The more widely used boats in Timor-Leste were assessed, including maintenance, materials and construction. The vessel assessment was carried out as it was identified during field visits that many of the boats owned by Timor-Leste fishers had deficiencies in construction and design and some were not appropriate for their intended purpose. Additionally, it was identified that the design and quality of the fibre-glass boats delivered by different state institutions should be improved in order to ensure safety for users. The vessel assessment, as with all safety at sea activities of the RFLP, involved several NDFA staff, who received on the job training/mentoring in order to provide sustainability after the RFLP period. The third part is aimed at pointing out issues that were not covered by the baseline survey, but that are crucial from a safety at sea perspective. This third section is based on the data from the first year of operation of the accident reporting system, which has shed some light on the actual causes of accidents at sea in the country.

Reducing the vulnerability for fishers and their families and improving safety at the work place should be a primary concern for all state institutions. Currently, several Ministry of Agriculture and Fisheries (MAF) partners working with the National Directorate of Fisheries and Aquaculture plan to carry out revisions of fisheries policies or parts of the legal framework. In order to avoid the mistakes of the past, it is crucial that new fisheries policies and laws use the best currently available data and are developed with an in depth knowledge of the particular idiosyncrasies of the sector in country. The present paper summarizes the preliminary findings arising from the available data and summarizes recommendations for both policy and planning, as well as for fishers. The advice for fishers has been integrated as part of the activities of RFLP under output 2 (Safety at sea and reduced vulnerability) from 2010 to 2013, which included awareness raising, capacity building, data gathering and management. This report is framed within a wider safety at sea strategy of the RFLP, aimed at documenting, identifying gaps and increasing the capacity of the government and the communities to reduce the number of accidents at sea. The main objective of this report is to serve as a tool for policy making; as such it contains some specific notes for

further action by fisheries managers and planners. With a view to ensuring further sustainability of the efforts put in place from 2010, this report also forms an integral part of the RFLP exit strategy.

## **2. PART I. TIMOR-LESTE LEGAL FRAMEWORK FOR SAFETY AT SEA**

### **2.1 Current safety at sea measures in the law**

Nowadays, most countries recognize the importance of safety at sea. Improving safety at sea by developing international regulations is in the common interest of nations, maritime workers and companies that carry out maritime-related activities. All international vessels using ports should be subjected to the Port State Control (PSC) inspections and additional control measures. Furthermore, the quality of inspection bodies has attracted considerable attention in recent times. Despite Timor-Leste being a full member of the International Maritime Organization (IMO)<sup>1</sup> the country is not registered as a Flag state with the International Maritime Organization (IMO), nor has it set up any marine organization. Moreover, it has yet to select an inspection body for safety at sea.

Since its independence, the Timor-Leste National Fisheries and Aquaculture Directorate (NDFA) developed, in the framework of successive projects, several policies and strategies for the sector. The 2001 Fish for the Future (MAF, 2001) is mostly focused on the development of the sector and the basic legal framework for management of the fishery, but does not address safety at sea matters. A similar situation exists with the document developed in 2005 (MAFF, 2005) as well as the latest strategic plan developed after the 2006 crisis which was re-focused towards environmental sustainability (MAF, 2007). At the time when these legal and policy frameworks were developed the information available on the sector was scarce and state institutions were still in a process of formation. However a recently drafted non-official plan 2010-2030 developed by the NDFA continued to focus on development and resource management of the fishery, and did not contain any specific actions for safety at sea. Despite this, the Ministry regularly recognizes the importance of safety at sea for fish workers and coastal communities whose livelihoods are closely linked with the sea. Currently, RFLP is the only fisheries project working on safety at sea matters for small-scale fishers in the country. Activities and safety at sea strategies are strongly supported by the government as well as fishers' organizations. Training and other actions are welcomed by the fishers and have been requested by institutions outside the scope of the RFLP. As a reflection of the shift in focus and the commitment of the NDFA to the safety of fishers at their work place, safety at sea is being included in the official five year strategy plan of the Ministry of Agriculture and Fisheries (2014-2018).

The fishing fleet in Timor-Leste (TL) is mainly comprised of small wooden canoes, weighing less than one gross ton<sup>2</sup>, that are locally constructed by fishers. Under Timor-Leste legislation this small-scale fleet is not subject to any specific regulation addressing safety at sea. In addition, only a few articles in the current fishing laws have any direct or indirect implications on safety at sea for fish workers and fishers.

Within decree law 6/2004 and government decree 5/2004, the following articles contain safety at sea related provisions<sup>3</sup>:

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<sup>1</sup> The International Maritime Organization's first task when it came into being in 1959 was to adopt a new version of the International Convention for the Safety of Life at Sea (SOLAS), the most important of all treaties dealing with maritime safety. The IMO has also developed and adopted international collision regulations and global standards for seafarers, as well as international conventions and codes relating to search and rescue, the facilitation of international maritime traffic, load lines, the carriage of dangerous goods and tonnage measurement. (Excerpted from IMO home page, [www.imo.org](http://www.imo.org)). For Timor Leste see Decree-Law 4/2003.

<sup>2</sup> The first Timor-Leste national census of fishers and boats was conducted by the National Directorate of Fisheries and Aquaculture during 2011-2012 with the support of the Regional Fisheries Livelihoods Programme for South and Southeast Asia. It is publicly accessible at [www.peskador.org](http://www.peskador.org)

<sup>3</sup> The account below refers mostly to the GD 5/2004; when referring to DL 6/2004, specific reference is given.

- i. Article 18 iv) provides that the request of a license for industrial, semi-industrial and fishery related operations must be accompanied by a Valid Certificate of Seaworthiness. Article 15 of DL 6/2004 provides that when the ship-owner does not have a fishing vessel in operational conditions during the period of validity of the permit, the license application should be rejected.
- ii. Article 49 in DL 6/2004 establishes periodic inspections as a mandatory requirement, although their periodicity is not further specified. Based on DG 5/2004, the annual license for commercial fishing, which is not transferable between vessels (as per art. 29 DL6/2004), shall be submitted in all cases following an inspection of the fishing vessel to which the license was issued as per article 24 in DL 6/2004 and 23 DG 5/2004. Article 24 DG 5/2004 provides that “The inspection shall verify whether the fishing vessel is in accordance with the fisheries legislation in force with regard to, among others, (a) Compliance with the hygienic-sanitary rules; (b) Existence of facilities and equipment required on-board; (d) Suitability of the fishing vessel to the type of fishing for which the fishing license was requested; (f) Certificate of Seaworthiness; or (g) Composition of the crew in accordance with the applicable legislation. Based on article 115, the same licensing conditions applying to the commercial fishing fleet also apply for the non-commercial fleet; among them the inspection of the vessels (as per article 130, 132).
- iii. Article 49 regulates the construction requirements and equipment of semi-industrial fishing vessels. Among other measures it envisages that semi-industrial fishing boats should i) Be equipped with radar, probe and radio as well as with other devices required by maritime legislation; and (k) Be equipped with rescue and emergency equipment established by appropriate legislation.
- iv. Article 50 on hygiene, handling and processing of fish on-board says that “Semi-industrial fishing vessels shall meet hygienic, sanitary, handling and processing requirements, in accordance with specific regulations”.
- v. The same provisions for articles 49 and 50 for the semi-industrial fleet are mentioned in articles 52 and 53, which regulate the hygiene and construction requirements respectively, but for the industrial fleet.
- vi. Article 58 establishes that the construction and modification of semi-industrial and industrial fishing vessels needs authorization from the Ministry. Article 59 on the requirements for the mentioned authorization, establish that the application shall comprise the following elements: b) The characteristics of the fishing vessel and fishing gears to be used; (d) The general arrangement plan and the descriptive memory of the fishing vessel in case of construction or modification of a fishing vessel; (e) A technical-economical justification for the construction or modification project; (g) A copy of the last fishing license issued if a fishing vessel has previously been involved in fishing activity; (h) Information on the overall state and location of the fishing vessel provided by the competent maritime authority; (j) The draft contract of the construction or modification, indicating at which shipyard or workshop the work will be undertaken.
- vii. Article 60 says that any foreign fishing vessel chartered by a national for industrial or semi-industrial fishing cannot be older than 10 years (from the time of construction), although it can be “authorised when vessel is in an overall good state and when its suitability for fishing has been duly confirmed upon inspection by the competent service of the Ministry.”
- viii. Article 64 provides the requirements for chartering authorization: besides the characteristics of the boat or the hygiene conditions, no safety at sea related certificate is requested. The same applies for the chartering of national boats (in article 65). Article 44 in DL 6/2004 provides that in case of a breakdown or inoperability of a licensed fishing vessel for a long period of time, the Minister may authorize, for a period to be defined by applicable

- regulations, the chartering of a fishing vessel by the respective ship-owner, to replace the vessel which is broken down or inoperable.
- ix. Article 67 establishes that only industrial and semi-industrial boats operating in the national waters have to be marked.
  - x. Article 126 provides that recreational underwater fishers shall (b) Keep a distance of 30 metres from the area in which there is another practitioner; and (d) Display proof of physical fitness to that end by showing an adequate medical certificate. Additionally, article 127 regulates the minimum age to get the license: over 18; divers between 16 and 18 can carry out their diving activity with the authorization of their legal representatives. Article 128 stipulates the prohibition of the use of any fishing gear or tool whose propelling force results from the detonating power of a chemical substance or from artificially compressed gas. Article 129 provides that the use of breathing equipment for skin diving or underwater fishing should be done by people having a medical certificate and a diving course with a recognised certificate.
  - xi. Articles 145 to 148 briefly refer to the Automatic Positioning System, which although with the primary objective of controlling the fishing fleets, also has safety at sea related functions. The regulation was developed through a specific Ministerial Diploma which provides the obligation of the companies to maintain the system. Articles 149 and 150 on radio communications have not yet been developed.
  - xii. On safety during fishing operations, articles 155 and 156 provide that vessels shall display navigation lights, flags and balloons required by the International Regulations for the Prevention of Collisions at Sea (IRPCS).
  - xiii. Article 201 sets up the mechanism for conflict resolution among fishers, one issue that has been considered worldwide as a potential cause for accidents at sea (territoriality, relations of competition and even conflict among workers). The article provides that conflicts among fishers notified to the Ministry would be resolved by means of a commission formed by three officers of the Ministry of Agriculture and Fisheries.
  - xiv. Lastly, articles 104 and 105 in DL 6/2004 envisage that the Minister shall promote the training and capacity building of fishing officers and inspectors as well as the construction, modernization, or renovation measures of fishing vessels with a view to creating a modern and competitive fishing fleet that is adapted to the fishing conditions in the country and that ensures efficiency in the activity, acceptable working conditions on-board, and improvement in the quality of fishing products.

## **2.2 Gaps and constraints in the enforcement of the current legal framework**

Although there is specific regulation on safety at sea, it does not target the small-scale fishing sector, which employs all the fishers in Timor-Leste (larger commercial boats operating out of Timor-Leste do not employ Timor-Leste nationals). Moreover the current legislation contains several gaps which prevent actual implementation.

For the certificate of seaworthiness, the fisheries law does not specify which institution can provide this certificate, nor the educational or technical requirements of the experts with authority to provide certification in the country. No further legislation has been developed regulating these aspects. The same applies to the construction of semi industrial and industrial fishing vessels. Although detailed plans and design briefs of any construction or modifications are required, the title or technical background of the author(s) of the plans are not specified. At the moment these documents are only requested for foreign boats as there is no company or institution in the country issuing these documents or providing the required services to conduct this process.

Currently SOLAS and NON-SOLAS<sup>4</sup> are the main existing laws in Timor-Leste which are relevant to safety at sea. However, they were designed specifically for cargo boats. NON SOLAS is being applied for fishing vessels operating in ports (industrial boats) in the absence of any other regulation, when it comes to specific systems of communication and safety control. However NON SOLAS is not an applicable legal framework for fishing vessels. The current development of new ports legislation provides an opportunity to link and share responsibilities in coordinated way between the NDFA and the Port Authority of Timor Leste (APORTIL).

For the inspection of fishing boats, the legal procedures for the issuance of fishing licenses are the responsibility of the staff of the National Directorate of Fisheries and Aquaculture, Department of Inspection. It has to be taken into account that most of the fishing fleet is comprised of small wooden canoes. In this case, a visual inspection of the condition of the boats is sufficient. However, the legal framework is not specific when it comes to the items to be considered when conducting a boat inspection that neither regulates the minimum technical background of the inspectors, who currently lack the specific technical knowledge to carry out the inspection of a semi or an industrial fishing boat. The same applies to the inspections described in paragraph vii above, relating to foreign fishing vessels chartered by nationals.

The classification of the fleet is complex. The artisanal fleet can be either be classified as subsistence (and as such regulated under traditional community based management systems) or commercial. An artisanal boat can be defined as being commercial whenever the “traditional vessel” is propelled by mechanical means, i.e. is motorized. Artisanal boats are currently defined under three criteria. Nevertheless, the definition of the semi-industrial and industrial fleets is based on a large number of criteria. As a result, the definitions are unclear, and a part of the fleet remains undefined, falling between classification categories with a number of boats fitting some of the criteria, but not others. As a result of this inaccurate scheme, a number of boats which can be considered to be belonging to a medium-scale fishing fleet (mostly based in Atauro island) fall into the artisanal fishing boat category, and as such some important safety at sea measures do not apply to them (see paragraphs iii, iv and vi above). Currently, given the complex definition of the semi-industrial fleet under the law, there are no boats at all licensed under this category.

The minimum skills required by skippers and operators are not adequately defined. Article 20 DL 6/2004 only regulates the obligations of the beneficiaries of licenses and article 27 their responsibilities. Promotion of training and capacity building are envisaged, but the areas of coverage have not yet been developed<sup>5</sup>. It has to be noted that currently there is no institution either providing or that could provide specific courses for skippers on navigation related issues. The newly planned Fisheries Technical School that is planned for 2014 can serve as a suitable platform for the further development of official capacity building programmes like this. Once set up, some subjects should be a recommended requirement<sup>6</sup> for the operation of at least part of the fleet. If the subjects are to become mandatory, the contents or requirements for their acquisition must be simplified.

Fines for infractions are regulated under Ministerial Diploma 06/42/GM/II/2005 and article 175 DL 6/2004. None of them mention the amount to be paid for not having the required safety equipment on board and in good condition for use. However, as it is a requirement for the issuance of a fishing license,

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<sup>4</sup> Decree-Law No. 4/2003 of 10 March on the establishment of the minimum safety and regulation requirements applicable to cargo ships not covered by the 1974 SOLAS convention.

<sup>5</sup> A Human Resources Development Plan for the NDFA has been developed (Fernández, Aguado, & Ramos, 2011) with a specific training plan to guide capacity building efforts.

<sup>6</sup> Fishers in Timor-Leste have generally low levels of literacy, therefore making training in specific topics a mandatory requirement could make many fishers legally unable to operate their boats.

it falls under article 2 of the MD 06/42/GM/II/2005. Based on this law, small-scale vessels are not required to have any specific equipment for either communication or geographic positioning. The construction requirements do not set any safety measures for small-scale fishing boats. Contrary to this, semi-industrial vessels have to be equipped with emergency, communication and geographic positioning equipment (see paragraph iii above); however, the articles regulating the safety measures for semi-industrial/industrial vessels, refer to “appropriate legislation” or “maritime legislation” that stipulate the requirements for this equipment. Additionally, given the complex criteria by which the type of vessel is defined, there are currently no semi-industrial vessels, as pointed out above.

Any planning for any further regulation of safety at sea equipment requirements for the small-scale fishing sub-sector, has to take into account that the majority of fishers in Timor-Leste operate within a few kilometres of the coast in small canoes. Any safety requirement regulated by law has to take into consideration the characteristics of the fleet (space available, capacity, etc.) and the income of the fishing families<sup>7</sup>. It should be noted that while most fishing operations occur near the shore, the majority of fishers are unable to swim. Additionally the main causes of accidents have to be considered, including bad stowage and overloading of vessels and bad weather. In addition, crocodile attacks are the main cause of accidents at sea and on the shore (mainly in the southern sea –see Part III of this document)<sup>8</sup>. As crocodiles play an important role in Timorese culture the importance of taking into account local systems of management and cultural beliefs, must also be highlighted.

The process of obtaining a fishing license in Timor-Leste is long, complex, and involves many steps. First a fisher has to travel to the capital Dili and complete and submit a form with data on his/her vessel to the Fisheries Inspection Department of the NDFA. Once submitted, a staff member from the Fisheries Inspection Department of the NDFA has to travel to the fisher’s village and confirm the boat specifications, against those on the completed NDFA form. Thereafter the fisher is given an invoice by the NDFA’s Licensing Section which s/he has to take to the bank, and pay the corresponding fee. As most fishers are illiterate and have very few years of formal education, most require help in order to complete both the NDFA and banking forms. The fisher must then take proof of payment documentation back to the NDFA. The fisher then has to wait for the license document, which has to be signed by the National Director of the NDFA. This process means days of lost fishing and income, incurs significant expenditure including transport for at least two trips to and from Dili and the coastal fishing village, and probably food and other costs for at least three to four days (two to three nights) in Dili staying with relatives or friends. Typically this process can take at least one to two weeks. In 2011-12 the RFLP supported the Fisheries Inspection Department of the NDFA to form a one-stop mobile licensing team<sup>9</sup> which travelled to all coastal communities in Timor-Leste and provided licensing and registration services taking less than two hours and costing only USD 5 (the annual license fee only). The first national census of fishers and fishing boats was completed in November 2012 and the data is publically available at [www.peskador.org](http://www.peskador.org) under the section “Lista roo/Boat list”.

It should also be taken into account that the Timorese fisheries laws were originally written in Portuguese, making interpretation difficult not only for fishers, but also for fisheries planners and managers because fishers and even NDFA staff have limited knowledge of this language. Translation into Tetum presents many shortcomings and as a result many NDFA staff have had difficulties in fully understanding the legal provisions. To address this in 2011 the RFLP developed a technical and a legal glossary and provided

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<sup>7</sup> For an estimation see (AMSAT Int., 2011).

<sup>8</sup> See the online database of accidents at sea developed by the RFLP as well as the “Dangerous places” map at <http://peskador.org/>.

<sup>9</sup> For further information see: [http://www.rflp.org/sites/default/files/Fact\\_sheet\\_mobile\\_licensing\\_service.pdf](http://www.rflp.org/sites/default/files/Fact_sheet_mobile_licensing_service.pdf) and [http://www.rflp.org/timor\\_lestecensus](http://www.rflp.org/timor_lestecensus)

specific training courses on their use for NDFA staff (Alfaiate, 2011). Thereafter a team was established which travelled around districts of Timor-Leste raising NDFA staff and fisher awareness on the main legal provisions affecting their daily working operations.

Spear gun fishing is a widespread livelihood among fishers in Atauro and Dili. This kind of fishing is accomplished on a regular basis in a wide area that cannot be realistically covered with the current NDFA staff and budget means even if there was a large investment in human and material resources. It is therefore unrealistic to try and regulate the minimum distance between divers fishing at sea.

Similar limitations occur with the application of the vessel monitoring systems (VMS) regulations or with the control of fishing in the different areas established by law. VMS systems are expensive and unaffordable for fisheries authorities in Timor-Leste. Furthermore they are intended to track legally licensed boats, creating a boundary between those who control (state) and those who are controlled (fishers), instead of creating effective partnerships between state institutions and the producers, who have also an interest in keeping destructive fishing out of their waters<sup>10</sup>.

Although the legal provisions establish that only the semi-industrial and industrial fleet has to be marked, the NDFA's Fisheries Inspection Department has gone one step further. NDFA policy has been to also mark the small-scale fleet, including small paddled vessels, classified in the law as subsistence fishing. This positive movement has provided for the first time an increased knowledge of the structural characteristics of the fishing sector in Timor-Leste and has been used to develop the first National Census of Fishers and Boats. However, this initiative has not been accompanied by a revision of the legal framework, indicating how in some cases fisheries planners are ahead of the process of legal framework adaptation, which is a slow process. This is severely constrained by the lack of specialized staff providing legal support to the NDFA, and the limited human resources in country with the capacity to provide advice on maritime/fisheries legal issues in Timor-Leste.

In summary, current Timor-Leste fisheries legislation needs to be adapted to the actual situation on the ground and the needs of the fishing sector in country. In the recently released Strategic Development Plan (2010-2030) (RDTL, 2011), the government of Timor-Leste has expressed its aim of developing an industrial fleet. However, this will require a huge effort to ensure that the fleet capacity and effort is based on the ability of aquatic stocks to support sustainable harvesting through implementation of an appropriate resource management system. The current fisheries laws are for the most part imported from other nations and ignore the NDFA human resources and budget limitations, and the actual characteristics and idiosyncrasies of the Timorese fisheries sector. Furthermore the approach to fisheries resource management has been restrictive and is top down in nature. It is aimed at controlling and punishing fishers and pays little attention to involving them and their organizations in the sustainable co-management of fisheries. A wide range of documentation from developed and developing countries has shown that any legal framework aimed at ensuring sustainability of resource use should take into account the views and needs of end users and stakeholders and bring them onboard in decision making processes. Additionally, any legal framework which characterizes a significant part of the fleet as illegal, and ignores or omits productive practices or traditional forms of exploitation and management of the natural resources actually deployed by the resource users, has the potential effect to allow abuses of authority and delegitimizes the apparatus of the state. A new state like Timor-Leste has the opportunity to learn from the experiences of other countries, and in this process a best practice would be to produce original legal frameworks adapted to the structural conditions of the sector and which effectively includes fishers in management. These should also apply to legal provisions on safety at sea.

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<sup>10</sup> See [http://www.rflp.org/sites/default/files/Fishers\\_patrolling\\_Timor\\_Leste\\_waters.pdf](http://www.rflp.org/sites/default/files/Fishers_patrolling_Timor_Leste_waters.pdf)



## 3. PART II. VESSEL ASSESSMENT

### 3.1 Background information

Little documentation is available on the technological transformations that have occurred in the Timor-Leste fisheries sector during the last decades. Based on available sources, it seems clear that the most recent and important transformations were conducted during Indonesian occupation (1975 to 1999). Previously, during the Portuguese colonial period, available documents (Figueiredo, 1966, 1968) report the dominance of boats powered by sails and paddles all around the island. A 1968 report, states there were only three mechanized boats, while 175 sail or paddle boats were recorded<sup>11</sup>. Portuguese documents highlight the importance of fishing in Atauro, which was presented as the main fishing community in Timor-Leste, where the most skilled boat builders resided and worked. Atauro fishers have a long boat building tradition, constructing both small canoes as well as boats for fishing and transportation that reveal seafaring nomadism practices. Today Atauro continues to be the most important fishing location and population in Timor-Leste.

The Indonesian colonizers began the process of transforming the sector. During their occupation, sails were almost completely replaced by engines and new fishing techniques were introduced. Cooperatives were promoted and bigger mechanized boats and new fishing techniques entered the fishery. Currently there are few remnants of the Indonesian attempts at modernization. The cooperatives failed for the most part, much of the donated equipment fell out of use and the fisheries infrastructure was burned or

#### Box 1. Decline in the use of sails



Atauro in the 60s. Photo: S. Pereira. Downloaded from [http://www.geocities.ws/diak\\_liu/index5.html](http://www.geocities.ws/diak_liu/index5.html)

*Small canoe for fishing alone powered by sail. Only few small boats like this remain using sails despite the cost of fishing operations would be considerably reduced with their use.*



destroyed at the time of the Indonesian withdrawal in 1999. Furthermore, it has been reported that the newly introduced technologies were not used for the most part by Timorese crews (MAF, 2001), but by Indonesian crews that were moved to Timor-Leste as manpower.

The forced movement of people from one settlement to another as well as the induced migration of inhabitants

from other islands to Timor-Leste resulted in some coastal populations with few people that were formerly fishers entering the fishery sector and learning new fishing techniques imported from neighboring islands. Of the innovations introduced some were adopted, but others were not. Based on the recollection of elders (Alonso, 2009) drift-nets were introduced at this time and today these are the main fishing technique used along the country's coast. Additionally some boat builders learned new techniques and sails almost completely disappeared. Despite this, today the fishing sector is not dissimilar to what it was during the Portuguese period. Now the majority of the fleet (around 60 percent) is composed of small wooden non-motorized out-rigger canoes. The remaining 39 percent from a total of 3,034 vessels in

<sup>11</sup> These numbers correspond only to the licensed boats and were estimated to represent 1/3 of the total fleet. The payment of licenses fees was common during the Portuguese period.

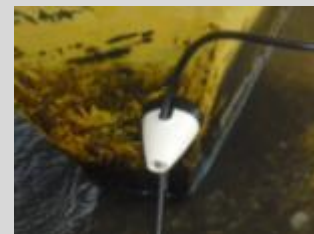
country, also wooden dugouts for the most part, are mechanized, but the total fishing capacity still remains low.

### 3.2 Specific objectives

RFLP supported the NDFA to conduct an assessment of the Timorese fishing fleet. The specific objectives of the vessel assessments were to:

- Document technical aspects of the current safety at sea situation in Timor-Leste that were not covered by the RFLP baseline survey.
- Provide basic information on the current technical characteristics of the Timor-Leste small-scale fisheries sector on construction, maintenance and repair as well as the status of the fleet.
- Analyze and assess the suitability of the introduction, production and hand-over of fibre-glass boats.
- Identify good boat builders currently available in country.
- Compare vessels, materials and construction alternatives feasible and available in Timor-Leste.
- Provide recommendations to guide planning and implementation purposes.

#### Box 2. Methods used in the assessment



*Photo 1. Trainer showing how to use the profile scanner*

*Photo 2. Measuring the angles with the profile scanner and the graduated. Staff of the NDFA learned the evaluation techniques in order to apply them in the future*

*Photo 3. Taking notes of the measures*

*Photo 4. Speedometers installed in the test boat*  
*Photo 5. Conducting the speed assessment. The boat delineates an S-shape course, doing a zig-zag between the floating markers*



To improve the capacity of the NDFA technical staff on design and construction assessments of fibre-glass boats, the vessel assessment was conducted with the participation of staff from the technology section, of the Department of Fishing Industry of the NDFA. Some of the results were integrated into several awareness courses on safety at sea conducted by the NDFA with RFLP support during 2011 and 2012 with the objective of improving vessel user safety.

### 3.3 Methodology

Vessel assessments were conducted at the following locations and dates:

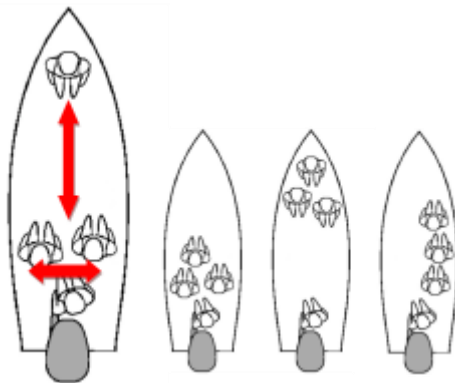
- Tutuala and Com, Lautem District, October 2010.
- Vemasse and Wataboo, Baucau District, December 2010.
- Four villages of the Atauro sub-district, from 11-15 January, 2011 to 26-30 June, 2011.

The assessment was organized by RFLP with the assistance of the Atauro, Baucau and Lautem District Fisheries Officers (DFO), as well as other selected staff of the NDFA. The NDFA staff were given both theoretical training and practical on-the-job vessel assessment training using simple methods that take

into account the constraints in facilities, the limitations on equipment available and the technical capacity of the NDFA staff. The following vessel assessment methods were taught and used:

1. Vessel measurement using
  - a. Tape measure,
  - b. Graduator, and
  - c. Profile scanner.
2. Measurement of maximum and average vessel speeds using a speedometer. In order to do this, five buoys were set up every ten metres.
3. A speedometer was used to calculate the maximum and averages speeds of each course. Averages of ten courses were calculated; for each course, weights within the vessel were distributed in different ways.
4. Relationship boat/engine. A tachometer was used to check the engine revolutions per minute (RPM). The relationship between the vessel velocity and the RPMs, gives an indication of the appropriateness of a particular sized engine to a particular sized boat.
5. Stability assesment. A group of four technical staff (sometimes including the vessel owners) operated the vessel during this assessment. To evaluate boat stability, the participant officers and boat owners were distributed differently for each course run by the boat. Four different arrangements of the people on the boat were conducted for each stability test, as shown in Figure 1 below. An external observer on another boat observed boat stability and its response to the different positioning of the crew on the boat. The external observer findings were cross-checked with those of the crew on the test boat.
6. How the boat cuts though the waves was also an item in the assessment. The degree to which the boat cuts through or rides over the top of the waves was observed by the crew members and the external observer, who exchanged roles during this test.

**Figure 1. The crew was unevenly distributed in the boat during the courses in order to check the stability with the assistance of an external observer**



All vessels tests were conducted using the same Yamaha 15 HP engine, which is an engine type widely used by Timorese fishers. The maximum RPM of this specific brand and model is 5,000. The maximum speed was checked for all boats tested at this maximum 5,000 RPM.

It is important that the engine size is appropriate for a particular boat. Where an engine is under-sized it is easy to lose control and the may even be damaged.

7. During the assessment, boat owners and operators were also interviewed. Visual observations were made of the current boat status and structural and material damage as well as design faults were recorded and photographed.

Twenty wooden canoes without outriggers and twenty outrigger canoes as well as three different designs of fibre glass boats were tested and assessed. See Box 3 for examples of the wooden canoe types assessed. The models were selected given their wide availability in country. Those selected were made by two different builders from Atauro, where the best wooden boat builders in Timor-Leste are based. Boats without outriggers are constructed in Waroana-northeast Atauro (some are bought and imported from Indonesia, mostly with in-board engines), while those with outriggers are built both in north as well as Makili-south Atauro. In both cases, there was a strong tradition of boat building before the Indonesian occupation; however in both cases boat builders adopted techniques imported by Indonesian boat builders during the occupation.

Several fibre-glass boats were also tested. This report only assessed boats delivered/donated by state institutions. The main two models donated by the government to fishers are the 2008 Nautilus and the 2009-2010 model, called 'Tuna'. See Box 3 for examples of the fibre-glass boat types assessed.

Other types of fibre-glass boats are operative in Timor-Leste. Among them the *rompon* boat delivered by the Spanish NGO Paz y Desarrollo to fisheries cooperatives and the *Ikuei* overseas produced fibre-glass boats namely the model 2003-2007 that can be found mostly in Tutuala and an improved model 2007-2009. None of them were included in this boat assessment, as only a limited number of them exist and their availability for purchase is very limited.

### 3.4 Summary of assessment

#### Wooden vessels without outriggers

While on the main island of Timor-Leste most small canoes have outriggers, in Atauro it is common to see long canoes which are not equipped with them.

This section summarizes the assessment of some of these boats, which are mostly constructed by boat builders from the northern side of Atauro Island.

#### Box 3. Types of boats tested



Wooden canoe without outrigger



Nautilus model 2008



Wooden canoe with outrigger



Tuna model 2009-2012

#### Box 4. Wooden vessels from North Atauro



Wooden boat in Atauro, Bikeli. Presents a shallow freeboard (only 5cm from the waterline). Stem shaped in clipper style.

Local wooden boat under construction. The bottom is built first; then the hull/body is added. Keel, frames and horizontal reinforcement bars are added at the end.



Boat builder shaping the frames of a wooden boat. A recent development has been the increasing use of electrical equipment such as sanders by boat builders. Nevertheless, machetes are still the most common tool in the construction of vessels, especially when it comes to boats built by fishers themselves.



Plain rounded shaped transom

### **Materials**

Formerly boat builders obtained their timber from local forests (mostly Ai-mutin, *Eucalyptus alba* and Ai naar, *Pterocarpus india*/Indian rosewood), but as regulations on the use of local wood have become more restrictive, vessels today are being made from materials imported from neighbouring islands of Indonesia. Despite this, wood is still the cheapest and most available material for boat construction.

Steel is used for nails, bolts and nuts. Stainless steel nails and bolts are both difficult to find in country and when available are expensive. For caulking of joints, epoxy and string are the most commonly used materials.

### **Design and construction methods**

Boat builders design boats based on their previous knowledge and techniques learned from Indonesian boat builders. These vessels are constructed with a clipper-type bow stem and a plain-flat transom within a rounded shaped stern where it is common to find a 15 HP Yamaha engine attached. The final shape of the hull depends on the selected wooden trunk used for construction. This boat offers a shallow freeboard, which constrains use in rough waters.

Such boats are used for fishing, but also for the transportation of people and goods, mostly around Atauro and to and from Dili. During the assessment, RFLP staff and NDFA technical staff visited two local boat builders in Biqueli and Waro-ana who construct this type of boats. None of the boat builders consulted used any numeric measurement or calculated design. Rather their boat design and construction was based on knowledge acquired and observations made over many years.

Logs are easy to buy and transport from nearby islands, however their price is high. However the use of imported logs makes these 7 to 10 metres boats expensive to build, ranging from USD 2,000 to 3,000. The price varies widely depending not only on the materials, but also on the closeness of the fisher's relationship (kin, neighbours, etc.) with the boat builder and the person who sells the logs.

Wooden boat construction typically begins with the keel and frames; however the local boat construction method is characterized for modelling first the hull. Depending on tree trunk length the hull is made from a single piece of wood made from hollowing out the trunk. Afterwards the hollowed out trunk hull is reinforced with frames and a keel. This type of boat construction poses important limitations for boat maintenance and durability. Once the main hollowed out trunk on which the remainder of the vessel is built becomes damaged or cracked due to humidity changes, salt corrosion, temperature changes and the passage of time, the boat has to be disposed of. For smaller boats, fishers are usually able to fix the cracks with a paste made from a mixture of petrol and polystyrene, however this repair is only a temporary solution. Only the boat parts that are attached to the main tree trunk (freeboard), including also the main frames and the keel, can be disassembled and replaced when damaged. Some boat builders however, use wooden panels to construct the hull. This is mostly the case with bigger boats of this type (more than 8 metres in length, although this depends largely on the boat builder and the budget of the final user). This construction type provides advantages, as broken or damaged panels can be easily replaced if damaged.

During sea tests it was readily apparent that some of the assessed wooden vessels were unstable because a) the boat design has insufficient width, or b) the vessel's bottom was too narrow, being shaped in a V-style. During test runs, the inspectors and operators were barely able to change their position inside the boat given the low level of boat stability.

### **Recommendations for boat builders and users**

In order to ensure vessel strength, boat builders should consider adding reinforcing materials and methods. The construction of the hull in pieces is recommended for both longer and smaller boats. Although it



would be difficult to change the bottom shape made by a single hollowed out tree trunk, it is strongly recommended that more bolts and nails (preferably of stainless steel) are used when attaching the frames to the main body of the boat's base. Frames and horizontal reinforcement bars must be bolted together. Where stainless steel is unavailable, it is recommended that the steel for both in-board and out-boards is painted with anti-rust paint.

Knowledge of boat users of the vessel's centre of gravity, stability characteristics as well as maximum safe loads would provide improved safety for boat users. The main challenge for this is the high rate of illiteracy among boat users as calculating the maximum safe loads involves complex calculations. A simple method to indicate the maximum weight a boat can carry should be tested. Boat

builders for example can be equipped with simple templates with which they can paint the maximum number of persons (as in the elevators) that can be transported in the boat before they are delivered. In that way boat users will be able to estimate the maximum weights, avoiding overloading, which is a main cause of accidents at sea in Timor-Leste (see Part III in this report).

Furthermore, the installation of outriggers on these vessels is highly recommended in order to improve stability.

### Outrigger wooden boats

Many different kinds of outriggers can be found along the coast of Timor-Leste (see Box 6. *Types of outrigger canoe*). Most of them are constructed from a single piece of wood, others bear wooden parts attached to the main wooden hull as in the case described above, while others comprise a hull constructed from different wooden panels. The outrigger wooden canoes tested were mainly of the third type, which is a more complex and better construction technique.

#### Materials

Materials used are the same as the wooden boats described above. For the construction of the skids, bamboo or polyvinyl chloride pipes (CVP) are used, attached with nylon ropes to the wooden crossbar poles that are attached (also with nylon ropes) to the main boat body.

Wood provides an advantage when it comes to floatation but it requires regular maintenance, such as caulking (filling the gaps between the wooden panels and parts) and re-painting.

During this assessment, it was identified that 17 boats out of the 45 vessels surveyed, needed repairing (37 percent). Many of the broken vessels were damaged because of the lack of proper maintenance. This was either because of lack of knowledge of boat owners of the importance of re-painting or because they

#### Box 5. *Bubur* boats from Makili



*Big single bubur trunk boat with panels attached for fishing and with no frames. The photo shows the structure used to transport a large fish trap.*



*Traditional bubur trap from Makili, South Atauro*

*Bubur boat constructed in the traditional way. Free board constructed with palm leaves. Double arrow shaped ends which locally symbolizes lineage system obligations.*



lacked funds to conduct regular maintenance. It would appear that the life of wooden boats is very short and it can be estimated that wooden canoes made of a single tree trunk only last for a maximum of 4 to 5 years. Durability differs between boat type one (see Box 6), which can be lifted out of and carried from the sea without being dragged and boat type two that has to be dragged from the sea as this results in damage to the base of the boat trunk. However, boats constructed using panels which can be replaced usually last 5 to 7 years. The price of a type two dugout canoe of 5 – 7 metres used with an outboard engine or a long tail<sup>12</sup> is about USD 350 to 500. However, the price of a good outrigger canoe of type three constructed with panels is about USD 2,500-3,000.

**Design**

As in the case of the wooden canoes in the previous section, boat builders who construct the type three outrigger boats described in this section, base their skills on knowledge gained from specific programmes during the Indonesian time. Meanwhile, the first and second type boat designs are based almost entirely on locally inherited knowledge.

There are as many types of outrigger canoes as there are boat builders. Taking into account that most of the type one and two canoes are shaped by their own fishers, it is not surprising that there is an enormous variability in canoe shape. Variations are not only found depending on location, but also within locations, as the shape of bows and stems serve, like colours, as a marker of household or group identity. Furthermore it should be noted that all these designs are restricted by the shape of the wooden tree trunk which forms the base of all hollowed out canoes.

The paddle canoes listed as type one are shaped at both ends; some of them are fitted with small skids or longitudinal outriggers. Fishers using this type of boat restrict their fishing activities to within a few hundred metres from the shore. These boats are used for fishing with hand-lines (trawling and bottom fishing) in the reef areas as well as the deployment of

short nets for small pelagic fish, such as sardine. When a big tree trunk is available, long boats (up to 7-8 metres) propelled by outboard engines can be constructed with panels to raise the freeboard (type 2). The cost of a small paddle canoe can be around USD 100 and a longer boat made of one single piece of wood

**Box 6. Types of outrigger canoe**



Type one. "Ro'o kik", made by a single piece of wood with paddles. With small outrigger (front) and without outrigger (back)

Type two. Boat made from a single piece of wood with panels attached. The simplest and cheapest version of this boat is without frames (left -Liquiça), although some are reinforced with frames (right -Atauro)



Type three. Big outrigger canoes built in South Atauro for fishing and transportation of people and commodities mostly from and to Dili. The hull is constructed with wooden panels and reinforced with frames. It has a wooden structure to provide shade. Transportation of commodities is a profitable activity and it has been reported that many fishers from Makili nowadays have shifted from fishing to transportation. The photo reveals a good level of boat maintenance with recent painting and new ropes used for lashing the skids. This boat is stable and the design is appropriate.

<sup>12</sup> Locally referred to as Ketingting. There are large differences in prices for these engines. The most widely available (and delivered by the state institutions and development actors) Yamaha 15 HP cost around USD 3,000, while a *ketingting* costs between USD 450 (3.5 HP) and USD 600 (5.5 HP).

can be around USD 200. In Makili, traditional single-trunk boats with the freeboard made with palm leaves are still in use for fishing using *bubu* or *bubur*, a traditional big trap which catches various species of small reef fish. In other areas these small boats can still be found propelled by small sails.

The main risk faced by fishers using small paddle canoes is attack by dangerous animals such as crocodiles. Canoes without outrigger are particularly unstable and it is common that fishers don't know how to swim.

The type two canoes, which are usually powered by 5.5 HP long tail engines (*ketingting*) or 15 HP outboard Yamaha engines, are topped with wooden panels which raise the freeboard and transom. The more simple models of this type two canoe, which are the most commonly found canoe along the coast of Timor-Leste have a total cost of around USD 250 and are not reinforced with frames. As they are built from a single piece of wood, they present the same problems of maintenance mentioned above. They are mainly used for fishing with hand-lines, bottom long lines or gillnet (driftnets), targeting small and medium pelagic fish. The catch of large pelagic fish is restricted by the capacity of the canoes. Longer narrow shaped boats with a crew of about 10 are also built to fish at fish aggregating devices (FADs) called *rompon*. Purse seines are currently being introduced in several areas of the country and the narrow canoe shape makes raising the net difficult. For the type two canoe it is common to find the canoe reinforced with frames and horizontal bars attached to the hull with only a few nails. In such cases, when the vessel hull or keel is stressed by wave impact (*hogging/sagging*) it can result in serious damage to the canoe and canoes can capsize and sink if this happens during fishing activities.

The most sophisticated outrigger canoe models can be found along the coast of Manatuto or Baucau, but mostly in Atauro. These boats are used both for fishing with different types of gillnet (driftnets) but mostly for the transportation of people and commodities. The movement of people and commodities to and from Dili and to the neighbouring areas of Atauro has provided many fishers with an attractive alternative livelihood to fishing. Currently, the ferry boat to Dili only travels once per week. This is not enough to meet the transport needs of the Atauro islanders (where for example, the supply of vegetables and other foodstuffs is limited and the people need regular transport to and from Dili). The journey is also expensive and requires travel via Beloi, where the port is located. Therefore many people prefer to travel with local fishers who travel almost daily when the weather and sea conditions are favourable.

#### Box 7. Details of construction and design



One piece outrigger boat from Valu, Tutuala, Eastern Timor Leste. This boat is used both for transportation of passengers to the Lulik (sacred) island of Jako (in the background) as well as fishing with hook and line.

The design reveals the point to which the wood tree trunks available affect the design of the boats.

Outrigger type three. Details of the panel joints of wooden boat construction.



This boat type requires more skilled construction skills, as the hull is always reinforced with frames and the hull's bottom is built with panels, increasing the durability of the boat. Type three boats are mostly found in Atauro. Boat builders at Makili and Waruana construct the bigger and more complex boat



models of this type. The panels forming the hull can be removed, the design is stable and the reinforcements ensure durability. In contrast, these more complex models have higher freeboards. This may result in a decrease in stability. Improper transom height may upset the boat trim inclining it to the head or the keel, and facilitating the entry of water. However, outriggers notably increase the stability of this type of boat. This fact is widely recognized and known by users: most of the interviewees highlighted their importance in increasing stability, vessel buoyancy and load capacity. To ensure the safety of end users, boat builders and operators should check the boat load capacity without outrigger(s) and should rigidly adhere to it. The major drawback of these better quality boat types is their price; besides the increased skilled level of these boat builders, the wood is usually imported from Indonesia. The final cost of a wooden vessel of about eight metres (around USD 3,000) is almost ten times more expensive than the price of a canoe made from a local tree trunk and modelled by the user. Furthermore, it cannot be powered with cheap, low power engines (see note 12).

### ***Construction method***

The construction method for type three boats is similar to that explained above for wooden canoes. The boat builders construct the main boat body using imported wood and the end users install their own outriggers. During the assessment it was noted that the outriggers were in general correctly installed. Fishers are able to correctly estimate the waterline and the position of the skids. The recent introduction of electrical boat construction tools, such as sanders and drills has provided considerable advances in construction times and finishing. However machetes continue to be the principal tool for boat construction work, mostly for the wood shaping phase.

In the case of outrigger canoes type one, they are for the most part constructed by their owner fishers. Wooden trunks are bought from suppliers who transport them from mountainous areas (often from coffee plantations on the main island, as these trees are used to provide shade in the plantations). The trunks are laid out on display in any strategic place within hamlets where all fishers can see them (such as on a road or path to the beach). On other occasions wooden trunks are brought by family members living near the forest or in mountainous areas who supply them at cheaper prices. Interested fishers will pay between USD 75 and USD 250 for small to large tree trunks. Once bought, the fisher shapes the trunk by hand using only a machete. The construction of a small canoe of this type can take months. If the trunk is big enough to construct a type two canoe, the process is the same as for a type one canoe. However, the finishing and installation of the panels to raise the freeboard is done by a specialist who is paid to conduct the work and if necessary to fit frames into the boat interior.

The final cost of a boat is affected by a variety of factors. These include the quality of boats, the skill of the builders and the use of imported or local materials. Price also depends upon the different mode of boat construction with type three boats being constructed by a boat builder, type one being constructed by fishers themselves, and type two boats being constructed by fishers themselves with the assistance of a boat builder for the finishing.. This results in huge differences in the prices of boats: from the cheapest boat one type (approx USD100) to the best boat three types (approx USD 3,000). For the majority of fishers it is very difficult to be able to afford the better quality wooden boats (type three), which are mostly owned by those who combine fishing with the transportation of people and materials to and from Atauro island.

### ***Recommendations for boat builders and users***

It is recommended that outriggers are made of double bamboo sections to guarantee their durability. To make outriggers fully effective, boat builders should consider the water line of the vessel when installing the skids.

Boat operators should always check the vessel/outrigger and engine condition before departure. If vessel maintenance is conducted properly, most boats should last for more than five years. Regular maintenance should be conducted at least every six months, including painting and caulking of all joints.

The main safety issue concerning vessels used for fishing or transport is the minimal knowledge builders and owners have of vessel loading capacity. Several accidents have been reported because of over-loading. A simple method to

calculate boat loading capacity should be provided to builders and owners to avoid accidents at sea. Simple templates can be used by boat builders to paint on each boat the maximum weight that the boat can carry, as pointed out in the previous section.

The high price of imported wood has severely constrained the access of fishers to good quality boats (Alonso, 2009). Poorer fishers, or those whose livelihoods comprise fishing, small-scale agriculture and animal rearing (the vast majority) cannot afford better quality wooden outriggers and continue to construct unstable and insecure, less durable outrigger canoes built using locally purchased tree trunks of inferior quality. A revision of the restrictions on the use of the wood for boat building purposes should be contemplated, particularly if boat building timber can be sustainably forested.

### **Fibre-glass Nautilus 2008 vessel**

A 2008 development project introduced fibre-glass boats as part of a wider programme aimed at the development of the sector through the donation of boats and fishing equipment, the creation of fishing cooperatives and the introduction of fishing techniques, such as bottom long lining. Today, many fishing groups have adopted the promoted fishing techniques. However the introduction of fibre-glass boats has had uneven impact. The introduction of fibre-glass boats has been promoted by various government and non-governmental programmes, including that of Spanish NGO Paz y Desarrollo under a specific loan scheme, the IKUEI overseas volunteers programme implemented in eastern Timor-Leste, the 2008 programme with the fishing cooperatives and the delivery of boats by the different government Ministries from 2009 until today.

#### **Box 8. Wooden outrigger vessels from North and South Atauro**



*Outrigger of Atauro. While in the rest of Timor-Leste the most common way to attach the wooden bars that support the skids to the main body of the boat is to lash them with ropes, in Atauro boat builders pass the bars through the hull.*



*Makili outriggers. Constructed by a local builder. Plain transom and raked bow.*

*Finished wooden outrigger boat. It has no keel and is only reinforced by 9 frames and 2 horizontal bars.*



Based on data from the National Directorate of Fisheries and Aquaculture, a total of 111 fibre-glass fishing boats were delivered to fisher groups between 2008 and 2010 by the NDFA. Different models were provided. The 2008 model was named Nautilus. The second model, delivered from 2009 to 2011, was called Tuna.

**Table 1. Boats produced/handover 2008-2011**

	NDFA Total Budget	Allocation of NDFA funds for Fibre-glass Boats and Motors distributed	Quantity of Fibre-glass boats Constructed	Numbers of Engine distributed
<b>2008</b>	No data	120,000 USD	No data	No data
<b>2009</b>	No data	70,000 USD	40 units	No data
<b>2010</b>	779,066 USD	300,000 USD	54 units	63 units
<b>2011</b>	No data	No data	No data	No data

The promotion of the introduction of fibre-glass boats had several aims: firstly it was linked to the protection and conservation of trees and forests and was aligned with the restrictive forestry use policy; secondly it was aimed at the modernization and development of the sector and at increasing catch levels; and thirdly it was aimed at improving the working conditions and safety at sea of fishers.

The introduction of fibre-glass boats however faced/faces many obstacles. Some of these are related to the way vessels were introduced while some of them are linked to characteristics of fibre-glass as a material. In the first case, it should be noted that almost all programmes promoting the introduction of fibre-glass (with the exception of the programme of the NGO Paz y Desarrollo) were conducted under the auspices of emergency programmes. The main objective was to restore productive capacity of the fishing sector, which was severely damaged after the withdrawal of Indonesia and the 1999 conflict during which most boats, nets and fishing infrastructure were burned and destroyed (MAF, 2001). When the conflict ended support from state institutions and non-governmental organizations included the donation of boats to coastal families. While this measure gave benefits to producers and consumers in the immediate post-conflict period, this type of support has continued well beyond the emergency period and this has had counterproductive effects. “Just giving” boats, engines and nets has been a common development approach taken by various institutions over the last decade, resulting in increased dependency of fishers on external aid. The availability of fibre-glass and the skills for fibre-glass repair are virtually non-existent within Timor-Leste and the materials are significantly more expensive than wood in the country.

The total cost of a fibre-glass boat is well beyond the reach of most fishers (around USD 2,750 for the Tuna model) if they had to pay for it themselves. Fibre-glass repairs are also costly. As a result it is common to find fibre-glass boats that have cracked but which have not been repaired, because the value given to the fibre-glass boats by their owners is equal to their cost, i.e. zero.

Most fishers are critical of the way beneficiaries were selected for boat donation. Fishers were not selected based on any specific criteria or on any official records (the first census of fishers and boats was only developed with the support of the RFLP in 2011). The fibre-glass boats produced and donated have not increased fishing capacity, as they are not appropriate for using more nets or more efficient fishing techniques while fishers can only fish the same number of days. On the conservation side, it has to be mentioned that after several years of investment in the promotion of fibre-glass, fibre-glass boats comprise less than four percent of the Timor-Leste fishing fleet with many of those vessels inoperative after less than one year of use. Once inoperative, it is common for their owners to revert to using wooden canoes for fishing, as it is cheaper to buy a dugout type two canoe, than it is to repair a fibre-glass boat.

Even when fibre-glass boats are still operative, the wooden canoes are not disposed of or replaced. They are instead used by other family members, friends or neighbours of the fibre-glass boat owners. This can lead to a slight increase in the levels of catch but at the cost of possible over-fishing in the same localized

fishing areas. As seaworthiness of the donated fibre-glass boats is only comparable with wooden outrigger canoes they have not allowed fishers to explore more distant new fishing grounds beyond inshore coral reefs. This report focuses only on the safety aspects of the fibre-glass boats donated by the state institutions, evaluating their design, construction and adequacy for fishing.

### **Materials**

Glass reinforced plastic (GRP) is a material widely used for boat construction given its low weight, strength, durability and ease of repair. It has to be noted that a wooden vessel has a specific gravity of 0.33 to 0.63, while a fibre-glass vessel has less buoyancy and a specific gravity of 1.50 to 1.60. In developed countries where materials and expertise for fibre-glass repair are readily available, maintenance of fibre-glass boats is cost effective. However in Timor-Leste, the availability of fibre-glass is low and it has to be imported under request, as there are no suppliers in country of fibre-glass materials.

The Nautilus 2008 was constructed using wood and fibre-glass. The boat was constructed using a sandwich method. Although the wood (*Ai mutin, Eucalyptus alba*) was covered using two layers of fibre-glass, the end result was a very heavy vessel. This is significant because the majority of fisher in Timor-Leste drag their boats up and down to the beach each day because of the lack of port infrastructure. Despite using good quality materials for the construction of the Nautilus, the finishing quality was poor. The majority of the Nautilus boats donated are currently damaged and unused, which reveals that the fibre-glass boat design and construction method was inappropriate for a boat intended for daily fishing activities.

### **Design**

The Nautilus 2008 is seven metres long, has a width of 1.1 metres and a depth of 0.09 metres. The general design of the hull makes the boat stable, however the height of the inner compartments of the vessel makes the distribution of weight inappropriate as the deck is too high. Furthermore, the resulting interior compartments, which are sealed, have no function other than buoyancy.

### **Recommendations for boat builders and users**

Although the donation of this boat model has stopped, they are still available in the second hand market. The excessive boat weight resulted in greater fuel consumption per fishing trip. It also made the boat slower which increased the time taken to go to and return from fishing grounds compared to wooden canoes.

Given the daily dragging of the fibre-glass boats from and to beaches and the minimal knowledge of fishers on fibre-glass maintenance and use, cracks and damage were common. This has discouraged fishers from using fibre-glass boats. After receiving donated fibre-glass boat, fishers were frustrated with their inability to repair them. Although the boats seemed big, the design has many ergonomic shortcomings and the available on-board space for the movement of the crew and fishing operations was actually relatively small. To those who received these boats and who continue using them, it is recommended that they anchor the vessel in the water at the end of each day. Additionally, the transom height of the vessel stern should be decreased to 520 mm to ensure improved power efficiency.

### **Fibre-glass Tuna 2009-2012 vessel**

After the 2008 programme it was assumed (incorrectly) that the Nautilus model was rejected by fishers only because its wide beam was very different to traditional Timorese wooden dugout canoe designs. In fact the low acceptance of the Nautilus fibre-glass boat was primarily due to the lack of shelter ports in areas where marine currents were constant and strong. This meant that fishers dragging the heavy fibre-glass boats up and down beaches and often damaging the keels and because they were inappropriately

designed and over-weight for long line and cooperative fishing. For all these reasons, the use of the majority of donated fibre-glass Nautilus boats has not been sustained.

A new model called the Tuna was developed in 2009. As the boat was lighter and the shape was similar to that of traditional wooden dugout canoes, the new model was better received by fishers. The following sections examine the features of the Tuna model.

### ***Construction and materials***

The boat was constructed of fibre-glass, with only the frames being made of wood. Many deficiencies have however been identified during construction of the Tuna model. The wood used for the construction of the frames was very weak. The skeleton of the vessel was made with softwood that was cut with cutters rather than by strong materials (wood or others) which could ensure durability.

The freeboard was constructed with eight layers of fibre-glass, and the bottom with 13 layers. This makes the boat too rigid and too expensive. The consequences of this lack of flexibility is that most boats cracked within a few months of use. The finishing, on the contrary, was good.

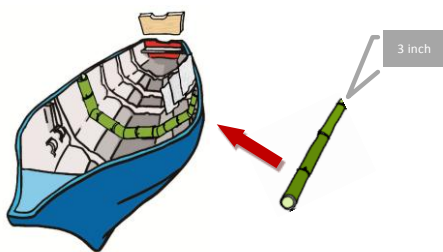
### ***Design***

The boat is 7.5 metres in length, has a maximum width of 1.3 metres and is 0.53 metres in depth, with a shape close to that of traditional wooden canoes. Based on design calculations, the Tuna model has insufficient stability; the possibility of sinking or being overturned is therefore high and some cases of this have already been recorded. Vessel owners have received insufficient information on the loading capacity of the vessel or on the need to install outriggers. At the same time, the Tuna is perceived by fishers as being more stable than a normal wooden dugout canoe and so many fishers have not installed outriggers. However this makes fishing using the Tuna model more risky.

### ***Recommendations for boat builders and users***

In order to ensure enhanced flexibility, the number of fibre-glass layers on both sides should be reduced from 8 to 3, and on the bottom the number of layers should be reduced from 13 to 5. Buoyant materials like polyurethane foam should be incorporated into the boat design.

**Figure 2. Bamboo reinforcements should be installed in the Tuna model to improve the safety of fishers.**



Stronger materials for the frames and keel should be used. Currently soft wood is utilized; locally available bamboo would improve the boat durability if used for the construction of the frames and keel. Fishers can also significantly improve the stability and safety of these boats by installing bamboo frames and using bamboo to reinforce the frames and keel of the boat. Hard wood timber can also be used.

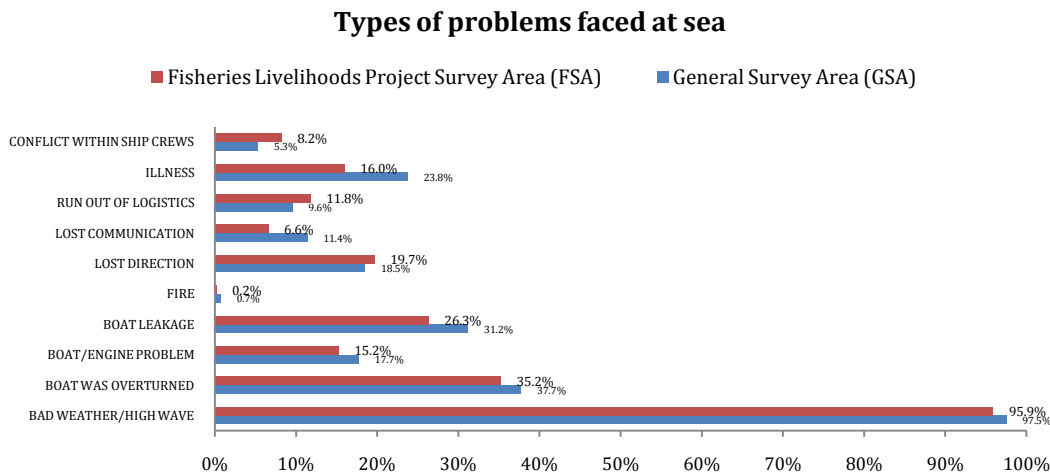
Like the Nautilus, no information was provided on the loading capacity of the Tuna model vessel or on its maintenance. Some simple graphics indicating the vessel loading capacity would improve the safety of fishers.

Boat owners should consider reducing the transom height by cutting the fibre-board. In addition, the safety and stability of the Tuna model will be significantly improved by installing outriggers.

## 5. PART III. ACCIDENTS AT SEA

Based on the baseline survey conducted by the Regional Fisheries Livelihoods Programme in its inception phase, the main problems faced by fishers were bad weather, boat leakage or boats getting overturned.

Figure 3. Types of problems faced at sea based on respondents answers (2011)



Source: AMSAT Int. (2011)

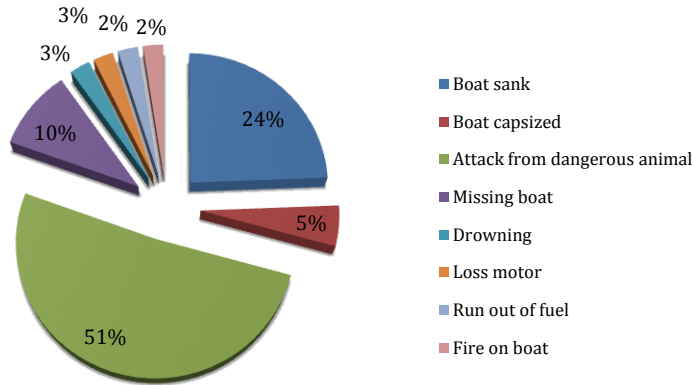
The baseline survey concluded that:

- “Although fishers commonly experienced problems at sea, in general fishers regarded accidents, injury and death as part of the job, but also acknowledged the impact of negligence. Fatal accidents were rare and the level of concern was therefore quite low.
- Fishing was generally conducted close to shore in small rowboats. If larger boats and engines extend the fishing range, safety will become more problematic. It is recommended that, through socialization strategies, a better understanding of the risks and benefits of fishing further from shore be created i.e. that it will bring greater returns while requiring more serious attention to safety preparations.
- Safety equipment was considered expensive and not a priority. Therefore increased awareness of safety regulations and practices should be encouraged including the role of avoidable negligence and sensible precautions. Training in the use of basic safety equipment, and programs to assist with access, should be implemented.
- Access to reliable/meaningful weather forecasts was an issue. Therefore improved access to weather information would be a good first step. This could be supported by access to inexpensive radios for fishers to monitor weather forecasts.”

While this study was done with a careful methodology based on random sampling, it relied on the responses of fishers. As of October 2012, some of these items have been addressed in one or another way under RFLP output 2 on safety at sea. Under its safety at sea strategy at the end of 2010 RFLP conducted a pilot project aimed at the establishment of an accident reporting system for the small-scale fisheries sector of Timor-Leste. After an initial pilot phase, the formats for gathering data as well as the reporting lines were simplified and integrated into a larger RFLP initiative for the creation of a National Fisheries Statistical System.

The accident reporting system, which is available at the online platform [www.peskador.org](http://www.peskador.org), has been active since mid 2011. Currently information is being gathered by RFLP Field Managers and District Fisheries Officers of the National Directorate of Fisheries and Aquaculture in several districts of the country. After one year of data collection, some light can now be shed on the real safety at sea situation and the causes of the accidents at sea and their magnitude and importance which previously were unknown<sup>13</sup>.

Figure 4. Types of accidents at sea. Series January 2010 - October 2012



Source: National Fisheries Statistics. National Directorate of Fisheries and Aquaculture, Timor-Leste.

As Figure 4. Types of accidents at sea. Series January 2010 - October 2012 shows, attacks by dangerous animals account for more than 50 percent of the accidents at sea reported (data from January 2010 to October 2012) and the majority of recorded fatalities. Of the 25 attacks registered only one was caused by a shark (on the Northern Coast – Liquica) and two by freshwater crocodiles (interior lakes/rivers). The remaining 22 were caused by saltwater crocodiles. However, although these accidents are classified under the same type, there are huge differences between shark and crocodile attacks according to local beliefs and customs.

Figure 5. Fatalities by type of accident

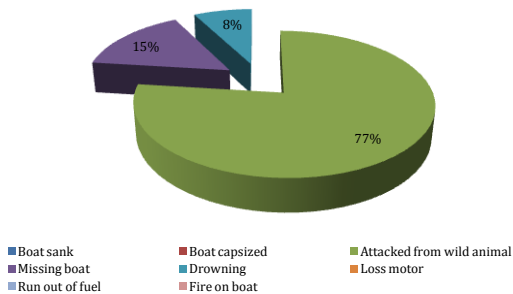
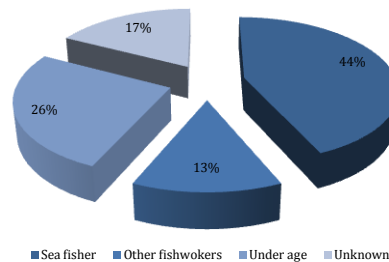


Figure 6. Status of the victims of accidents caused by attacks from wild animals



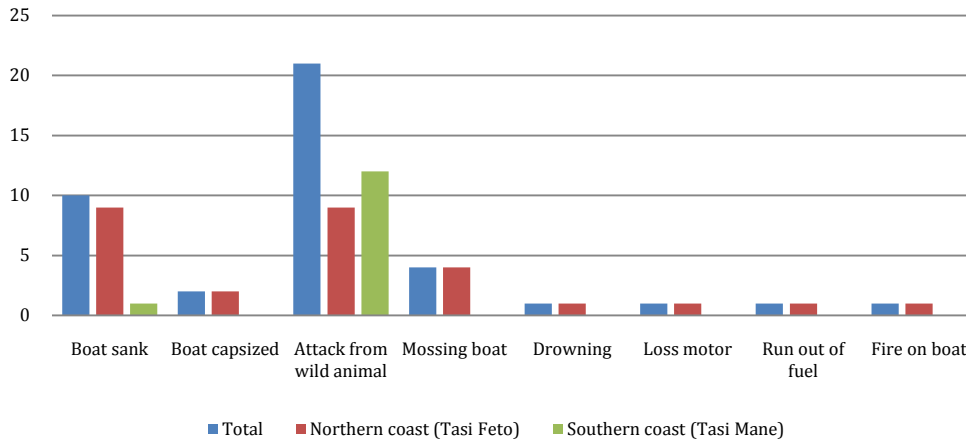
Source: National Fisheries Statistics. National Directorate of Fisheries and Aquaculture, Timor-Leste.

<sup>13</sup> See the above RFLP Baseline Survey results as an example.



The majority of crocodile attacks occurred in the Southern sea, where the population of saltwater crocodiles is bigger and more concentrated both along the coast and in coastal lakes and estuaries<sup>14</sup>. Victims include fishers operating at sea (categorized as *sea fishers*) and fishers conducting other productive activities in inter-tidal areas (categorized as *other fish workers*) - mostly women, and children while either gathering resources in the inter-tidal areas or simply near the coast/river. While the majority of crocodile attacks (both reported and unreported attacks) occur in the southern waters, attacks in the northern sea have also been reported and mainly in the districts of Baucau and Bobonaro.

Figure 7. Types of accidents by area (South and North Coasts)



Source: National Fisheries Statistics. National Directorate of Fisheries and Aquaculture, Timor-Leste.

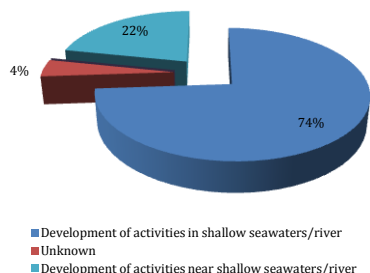
The available data does not provide sufficient information to comment on the patterns of crocodile attacks. However there seems to be a concentration of crocodile attacks from 18.00 to 21.00 hours. This may be due to more people gathering around these times near shallow waters for the purpose of socializing, collecting firewood and other resources, for washing, swimming and playing or collecting water for domestic use. Although not statistically significant, the available data suggests that more crocodile attacks occur during the rainy season, however more time series data will have to be gathered to confirm this. The majority of crocodile attacks result in the fatality of the victims. Only 13 percent of crocodile attack victims were reported to have survived and recovered.

The challenges for gathering data on crocodile attacks in Timor-Leste are numerous, while preventing crocodile attacks is a significant challenge. It is likely that most crocodile attacks remain unreported. The number of accidents from crocodile attacks in the southern sea is probably much higher than the current data available shows and than initially estimated when RFLP first commenced activities.

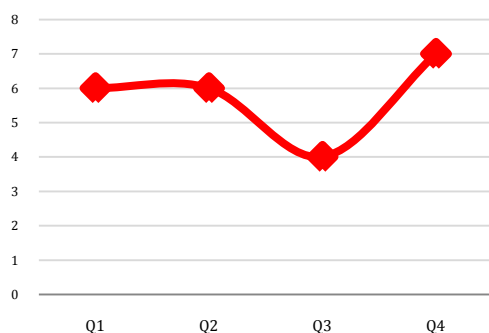
<sup>14</sup> Details on the accidents recorded can be found at [www.peskador.org](http://www.peskador.org) in the section “Accidents at sea/Aksidente iha tasi”.



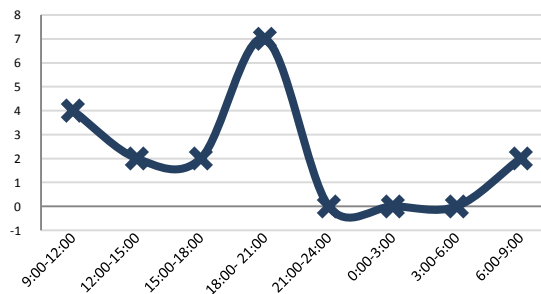
**Figure 8. Location of the victim when the crocodile attack occurred**



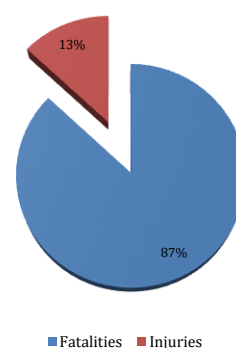
**Figure 10. Time of year when the accident occurred**



**Figure 9. Time of the day when the accident occurred**



**Figure 11. Consequences of the crocodile attack**



Source: National Fisheries Statistics. National Directorate of Fisheries and Aquaculture, Timor-Leste.

It has to be noted that many non fishers living in remote coastal areas are also victims of crocodile attacks<sup>15</sup> and these accidents are often unreported. Crocodiles are considered sacred (*lulik*) beings subject to taboo and respect. The cultural attachment of the Timorese population with the crocodiles is reflected in Timorese law, under which it is a protected species. Being the victim of a crocodile attack can be considered a shame for the individual or the family, as it is widely considered that crocodile attacks occur because the victims/their families have committed offenses against their ancestors. In most cases the victims do not report the accident and do not go to hospital; as the cause of the accident are considered non-physical i.e. spiritual in nature, the remedies sought require the performance of traditional healing methods which include the performance of purification rituals and restoration of the order, i.e. the relationship between humans and non-human beings. These methods are widely preferred to taking the patient to a hospital. These facts provide an explanation for the difference between the results gathered during the RFLP baseline survey (based on respondent's views) and the results of the accidents at sea database (which is a register).

Disregarding the crocodile attacks and analyzing only the causes of boats sinking or capsizing at sea, unexpected bad weather and overloading of vessels were the second most important causes of accidents.

<sup>15</sup> For this reason the rate of crocodile accidents recorded by the NDFA is very likely to be significantly underestimated.

Boats going missing or loss of equipment occurred mainly because of unexpected bad weather and poor engine condition.

Figure 12. Causes of boats sinking and capsizing

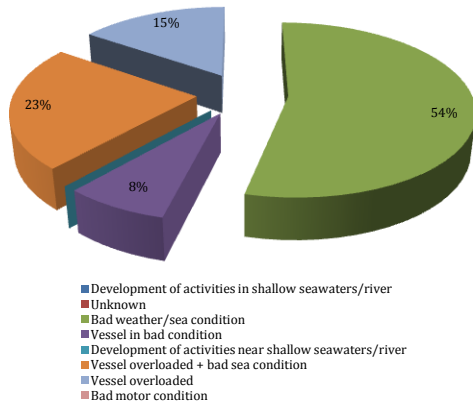
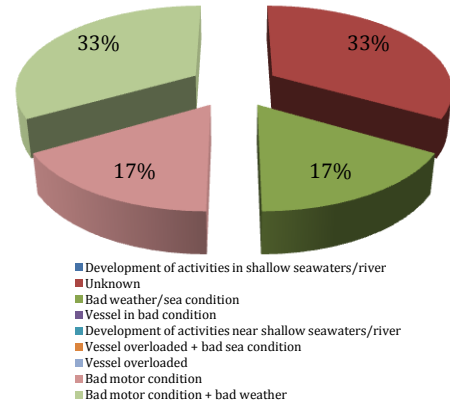


Figure 13. Causes of boats going missing or equipment loss



Source: National Fisheries Statistics. National Directorate of Fisheries and Aquaculture, Timor-Leste.

In addition to the above accident causes it should be stressed that many problems have been identified related with diving which put fishers at risk. In Atauro many fisherwomen and fishers catch fish for their everyday consumption or for sale in their local market by diving and spear gun fishing. Although no fatal diving accidents have been recorded, divers suffer from specific occupational health problems that should be given further consideration and specific safety at sea action. Specific programmes should address the main risks which spear fishing divers are exposed to, including decompression sickness.

Contrary to what is generally thought, including the RFLP mid-term evaluation team report, fishing in shallow waters has been shown to be much more dangerous than fishing in deep waters in Timor-Leste. Specific programmes to address these issues must be designed and implemented, and specific research should be conducted before any remedial measures are taken. Measures should consider the local structures of decision making and the ritual and traditional authorities, whose role would be definitive in the solution of the problem. In this vein, any measure taken should be not only ecologically adequate, but also culturally sensitive.

## RECOMMENDATIONS

This report summarizes specific recommendations that have already been provided to fishers and boat builders in different ways through the safety at sea activities of the RFLP. However, as pointed out above, this document is also targeted for use by fisheries planners and policy makers beyond the implementation of the RFLP. This section summarizes specific recommendations for policy making.

### *For the legal provisions on safety at sea*

1. To eliminate sub-standard boats that cause a significant threat to safety at sea, further consideration is needed for Timor-Leste to set up their own Flag State with the International Maritime Organization (IMO) as soon as possible. Timor-Leste also needs to select quality inspection bodies, to enrol them as members of the International Association of Classification Societies (IACS) or European Maritime Safety Agency (EMSA) and to develop its own safety standards.
2. To date, there is no ship building company in Timor-Leste which meets the requirements of the International Organization for Standardization (ISO). Moreover, Timor-Leste has yet to have an assessment/inspection body for ship building. This should be established under the umbrella of an inter-ministerial body which at least should include both the Port Authority and the Directorate of Fisheries as members. Coordination between the NDFA and the Port Authority should be ensured.
3. Inspection of fishing boats should continue to be the responsibility of the Department of Fishing Inspection of the NDFA. In this regard, specific capacity building should be provided in the near future to increase the capacity of Department of Fishing Inspection staff to conduct inspection of semi industrial and industrial boats.
4. Minimum technical requirements for the issuance of certificates as well as for the development of designs should be established and approved. At the same time institutions or companies should be established which are capable of providing specific training and certificates that are currently required by existing law. Currently there are no such institutions in country capable of doing this. The Timor-Leste Fisheries Technical School project should address these issues and integrate them into their curriculum.
5. The procedures established by law for the issuance of fishing licenses should be revised and simplified, adapted to the structural characteristics of the sector and the limitations in mobility and resources by producers.
6. The classification of the fleet should be simplified to ensure that all vessel types within the fleet are defined. Simple criteria should serve to categorize boats as semi industrial or artisanal, so that specific safety at sea requirements can then apply to them. In addition fishing zones should be simplified taking into account the limitations on controlling the operation of fishing vessels, and specifically the industrial fleet (both domestic and international).
7. Appropriate vocational training courses should be delivered for skippers and boat operators to improve safety at sea. The establishment of the Technical School can provide a proper platform for this.
8. Specific equipment can be required for the operation of small-scale vessels. If specific legislation on safety at sea for small-scale fishing vessels is developed, the infrastructure and budget limitations of the NDFA, the constraints of fishers to purchase equipment and other characteristics such as boat capacity should be taken into account. As an example, RFLP provided special plastic bags to fishers so that they

can take their mobile phones with them when going fishing. As the majority of fishing areas are located near the coast where there is usually telephone coverage during most of the working time, the majority of fishers can have a measure of communication. This strategy has already proven successful<sup>16</sup>.

9. While awareness raising should be conducted for divers on the safety measures to avoid the highest risks during fishing, specific regulations such as the setting up of the minimum distance between divers during operations should be withdrawn. Resources, number of staff and budget available make the enforcement of this kind of provision almost impossible. In addition this type of regulation can be used as a mean of abuse by the authorities against resource users.

10. The introduction of the RFLP promoted Community Based IUU reporting system using SPOT®<sup>17</sup> should become regularized as a national policy on IUU. Contrary to the traditional VMS system, the Community based IUU reporting currently operative in Timor-Leste effectively engages fishers in the reporting of illegal activities. Current regulations provide an opportunity for its regularization by dispatch from the Minister.

11. The formalization of the IUU Community Based IUU reporting system should be accompanied by the creation of a body to respond to calls for help and reports of illegal fishing activities sent by fishers using the reporting devices. A pre-agreement was made during a workshop held in 2012 with RFLP support by which representatives of the relevant institutions agreed to create a National Maritime Security Committee. This Committee should be responsible for the establishment of the legal basis as well as the operation and administration of a common operations centre, should be composed of representatives of the Naval Component, F-FDTL (army), Maritime Police and PNTL (National Police of Timor Leste), Customs, NDFA, Quarantine, Port Authority, Immigration and Fire services. The mentioned pre-agreement was reached before the 2012 elections. It is desirable that the new government (V Constitutional Government) take steps to follow-up on the materialization of the agreement.

12. More awareness raising on current fisheries regulations should be done. The dissemination of laws has proven to be a successful activity which opens a forum of communication and discussion between the NDFA and fishers. Any changes in the law should be preceded by specific consultations with the sector both through community consultations and through the National Fisheries Consultative Council (regulated under the law – article 175 6/2004). Revisions to the law should be accompanied by awareness raising campaigns by the already established *Mobile dissemination of fisheries laws*. Dissemination of laws should be simple and adapted to the needs and capacity of the audience.

13. More emphasis should be given to improving the capacity of the NDFA staff to appropriately interpret the law. This emphasis should take into account the language constraints.

14. Development of new laws and or revision of the legal framework must not be considered an aim in itself. Imported legal provisions should be avoided and a specific legal framework in line with the needs and structure of the small-scale sector should be developed. It should be noted that the absence of law can be more beneficial than the implementation of inaccurate laws, as they can facilitate power abuse. The RFLP developed National Fisheries Statistical System provides a powerful tool that can be used to adapt the current legal framework to the needs and characteristics of the fishery.

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<sup>16</sup> [www.rflp.org/lives\\_saved](http://www.rflp.org/lives_saved)

<sup>17</sup> An explanation on how this collaborative system for the reporting of IUU works can be found at: [http://www.rflp.org/sites/default/files/Fishers\\_patrolling\\_Timor\\_Leste\\_waters.pdf](http://www.rflp.org/sites/default/files/Fishers_patrolling_Timor_Leste_waters.pdf)

15. Some fisheries planners have to plan and initiate without legal assistance. More emphasis should be given to enhance the capacity of specifically fisheries planners and managers as well as in producing materials which incorporate a better understanding of the law. However, it is highly necessary to have input from a legal advisor to provide on-the-job support and mentoring for NDFA staff on a daily basis.

#### ***For boat assessment***

16. The donation of free boats is strongly discouraged. A different approach to modernization of the fleet is recommended. The new approach should not consider the fishers mere recipients but as proactive actors with a responsible role in the sustainable development of the sector. Currently boat delivery is considered a right by fishers instead of a benefit.

17. Any policy aimed at renewing the fishing fleet should involve all the government and non-government institutions which are currently donating boats and fishing equipment, so that a harmonized joint strategy is implemented with the Ministry of Agriculture and Fisheries as the lead agency.

18. If the objective of the institutions that donate boats is to modernize the fleet and to increase fishing capacity, the newly established Banco Nacional de Timor Leste provides a good opportunity to develop a special loan scheme for fishers. In this case it should be re-conceptualized as a specific *Programme for the development of the fisheries sector*. The provision of boats under a special loan scheme, instead of donating boats *gratis* will enhance engagement by the different stakeholders and particularly fishers.

19. If the aim of the institutions that donate boats is to improve the working conditions of fishers and to improve their safety at sea and to reduce their vulnerability it should be re-conceptualized as a *Programme for the renovation of the fleet*. The objective of the Programme should be to replace the oldest and most unsafe boats that are operative in country. If this is done, the following criteria for the donation of boats are recommended:

- i. The fisher should have a valid fishing license and be registered on the national fisher census.
- ii. The beneficiary has to have a boat similar to the one that is to be donated. Length of the boat can be used as a parameter. For example, if 7 metre fibre-glass boats (Tuna model) are to be donated, owners with mechanized boats between 5 and 8 metres can apply.
- iii. Year of construction of the boat. Only the oldest boats active will be replaced. This will require verification by NDFA staff (Department of Inspection) before the any boat is handed over, of whether the old boat is still in use and operative.

20. If the aim of the institutions that donate boats is to increase the resilience of fishing communities, the programme should be re-conceptualised as an *Accident at sea recovery programme*, and as a continuation of the RFLP-NDFA pilot programme on small grants after accidents at sea. The pilot program was developed with a small investment (maximum of USD 500 per accident; each grant cost is 1/6 of the cost of each fibre-glass boat currently being donated by various government institutions to fishers – Tuna model); the scheme gives clear criteria for the receipt of the grant (valid fishing license, accident duly reported, letter of acknowledgment of the accident by the local authorities) as well as the equipment provided. Benefits from the programme have been already reported by beneficiaries.

21. The three programme schemes mentioned above, namely the *Programme for the development of the fisheries sector*, the *Programme for the renovation of the fleet* and the *Accident at sea recovery programme* could constitute three lines of action under the umbrella of the *Fund for the development of the small scale fisheries*, regulated under the current law.

22. If fishing boats are to be supplied under any of the above mentioned programme schemes that are developed by appropriate relevant institutions, the following issues should be considered and addressed:

- ✓ One primary item during the assessment of bids/quotes from different boat suppliers should be the design as well as the details of the materials to be used for boat construction and the background and experience of the boat builders. In order to do this it is specifically recommended that a technical body is established which includes officers of the Department of Fisheries Industry (Fishing technology) and Fishing Inspection who were trained by the RFLP safety at sea international consultant, who will assess the different boat designs and quality offered by the boat building companies. Only safe boats should be promoted<sup>18</sup>.
- ✓ Specific beneficiary selection criteria should be established and agreed. The newly developed first National Census of Fishers and Boats provides all the necessary data for this purpose.
- ✓ Beneficiaries should sign a contract by which s/he commits to contribute data on fish catch and other information as required by the NDFA.

23. In developing more programmes aimed at the introduction of fibre-glass, it should be noted that currently fishers cannot afford to purchase fibre-glass boats. In this regard:

- i. The forestry policy should be reconsidered in order to accommodate the needs and possibilities of fishing families. There may be an opportunity to develop a long-term sustainable forestry project to supply hard wood timber for fishing boat construction and repair.
- ii. As procuring boat construction materials other than wood is not feasible for fishers in Timor-Leste, it is recommended that support is given to regular maintenance of wooden fishing vessels. This can be in the form of subsidizing re-painting of vessels, and the provision of vessel design expertise, etc.

#### *Other safety at sea matters*

24. A national awareness raising campaign should be conducted to make key fishery sector stakeholders fully aware of all relevant information available concerning (1) safety equipment and communication tools, (2) safe operation and maintenance of equipment, and (3) weather forecast and locations prone to accidents. Information should be communicated at the community level through educational seminars/technical training as well as being posted at the fisher's community centre at the village level such as Lotas de Pescas, as is currently done by the RFLP Field Managers. The District Fishery Officer or Extension Officer should be involved in the regular updating and disseminating of this information. Innovative ways to spread information on weather forecast and sea conditions (e.g. via SMS messages to all fishers with a mobile phone) should be explored.

25. Specific awareness rising campaigns on diving related risks should be continued.

26. Specific training courses should be designed for boat builders who should be obliged to provide information on the loading capacity of each boat they construct. This can be done by providing them with simple templates that can be used to paint the maximum number of people or weight which the boat can carry.

27. Specific awareness raising should be done to encourage boat users to practice regular maintenance of their fishing boats.

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<sup>18</sup> For example old fibre-glass moulds owned by the NDFA from the Indonesian time provide opportunities for the construction of more stable and better boats.

28. Training courses on engine maintenance and repair (level 1 – basic) for fishers should be continued beyond the RFLP period. Specific programmes for level 2 – advanced knowledge on boat engines repair should also be undertaken. The Fisheries Technical School provides an appropriate and opportune platform for their development.

29. The majority of accidents at sea are caused by saltwater crocodile attack. Crocodiles are regarded as sacred beings (*lulik*) and are subject to respect, to specific taboos and prescriptions. For these reasons:

- i. Inter-disciplinary research should be done both on the behaviour of the animals and on the traditional beliefs and practices associated with them.
- ii. Any action to mitigate against crocodile attack should be culturally sensitive and take into account not only the social structure and traditional authorities but also the complex system of beliefs and ritual practices in Timor-Leste.
- iii. Any kind of coastal livelihoods likely to stimulate relocation of people to areas near lakes, mangroves or other areas where the crocodiles are more abundant be strongly discouraged, at least until mitigation measures can be implemented to reduce the number of fatalities from crocodile attack.

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