Economic Assessments for Ballast Water Management in Turkey

Undersecretariat For Maritime Affairs of Turkey

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This Report is prepared by using the approved statistical information from administrative bodies of Turkey. These bodies are The Prime Ministry State Planning Organization, The Prime Ministry Undersecretariat for Maritime Affairs, Chamber of Shipping and registered Lloyds.

In some cases there were some complications on defining the cost of different services. Because the tariffs changes due to many parameters. On this kind of situations, some calculations made including approximations like as mean values.

Also the experiences on organizing national and international meetings were very helpful on calculating the economical extend of training activities.

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Contents

Preface

The economic impacts of invasive alien species can be very large. One of the worst marine species invasions occurred in the early 1980s when the North American comb jelly (Mnemiopsis leidyi) was introduced into the Black Sea through ballast water. It rapidly took hold and by 1989 the famous peak values of biomass for M. leidyi were obtained in 1995 1.5 to 2 kg WW/m2 consuming vast quantities of fish eggs and larvae as well as the zooplankton that commercially-important fish feed. Assuming a costs of about 1 USD per kilogram of fish, the minimum economic loss for Turkey alone would be more than 1 billion USD. (Kıdeys 2005)

Successfully managing IAS can provide long-term economic and environmental benefits, including conserving biodiversity and health of ecosystems, and maintaining the services they provide. This supports the case for strategic investments in prevention rather than post-invasion damage control, including ratification of the Ballast Water Management Convention and developing necessary national strategies and policy frameworks. While national policy frameworks need not be unduly burdensome, they should meet standards set forth in the Ballast Water Management Convention. Associated with ratification of the convention is thus a certain cost in ensuring compliance, related to e.g. planning, monitoring, enforcement and capacity building.

Economic analysis of IAS, their possible impacts and management options can support strategic decisions regarding IAS responses, and facilitate national planning. This report is primarily aimed to serve as a practical tool to support the development of a national ballast water management strategy. However, it also has a broader utility for considering the economic aspects of IAS impacts and management responses, and can be used for other decision support, including making a case for ratification of the Ballast Water Convention.

For the purposes of development of a national ballast water management strategy, a simple economic assessment based on readily available data, such as national statistics, is often sufficient. This report is prepared to provide a straightforward and structured approach to undertaking such assessments. In some instances, however, much more detailed analysis may be desired, in which case it is recommended to engage an expert economist. While detailed methods for economic assessment and valuation is beyond the scope of this report.

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THE AIM OF THE ECONOMIC ASSESSMENT

This report is prepared in order to assess the economical overhead of ballast water management activities to existing maritime operational system of Turkey. Also it is aimed to make a comparison between the effects of the aquatic invasive species and the cost of the national ballast water management system.

This economic assessment study demonstrates and quantifies the economic values of an ecosystem and the potential impacts to these values by introduction of an invasive species; also it specifies funding needs to implement management policies.

While calculating the cost items, it is aimed to define the activities which could handle with in kind contributions. Because there is an existing maritime management infrastructure is working and most activities could be added to this system without resulting any extra costs to the country.

Also it is aimed to define that successfully managing invasive aquatic organisms can provide long-term economic and environmental benefits and prevention activities are calculated as cheaper than the post-invasion damage.

This assessment study is primarily aimed to serve as a practical tool to support the actions on the national ballast water management strategy.

The results of this report are supporting the national decision on ratification the Ballast Water Convention.

2. SOURCES OF INFORMATION

The Prime Ministry State Planning Organization is the responsible authority for preparing the 5 years development plans. During the preparation process of this assessment report the statistical data on the 9th National Development Programme for 2007-2013 was used. The sector reports which were prepared under the national development programme give the basic statistical information on the economic extend of the sectors.

The preparatory activities under this assessment report were calculated by using the costs of similar training activities which were held in Turkey within the scope of the Globallast Partnership Project.

The costs of legislative, policy and institutional reforms are calculated by using the costs of the similar work packages of the national ballast water management project of Turkey.

The compliance-related costs are calculated by using the similar service tariffs of the chamber of shipping and the registered Lloyds in Turkey.

3.

METODOLOGY

In this study the below mentioned basic economical assessment methods were used.

Market price analysis

Market prices can be used for any ecosystem good or service that can be bought or sold, and can be applied to e.g. loss of income, loss of employment, loss of marketable goods, costs etc. This is a comparatively inexpensive method, and requires less data intensive analysis to arrive at a value. In addition, this technique is flexible enough so that it can be used e.g. where an invasive alien species has replaced or diminish directly consumable species, when invasive alien species affect the production of marketable goods, or when invasive species themselves become marketable goods. This means that market price analysis often is recommended when a valuation study is to be conducted for an invasive alien species impact, whereas many other techniques, while valid and valuable in their own right, require much longer time periods for data collection, analysis and reporting. An added benefit is that many countries already collect the data necessary through the collection of national statistics, making this an easy technique to carry out “in-house.”

There are a few caveats to using the information, though. If the market for goods and services is distorted by subsides or other market externalities, the results may not reflect the true economic and social costs of an invasive alien species impact. However, awareness of such factors can be sufficient to recognize that the market prices may under or over estimate the true costs, and make necessary corrections. Lastly, while this methodology determines the value of products derived from an ecosystem, it can miss the true (complete) value of the ecosystem due to only examining the market for goods, while excluding other non-marketable services.

Process outline

The economic variables needed for this type of analysis are straightforward and generally easy to collect and analyze through the following steps:

1. Collecting data on or specifying the change in the quantity of the good or service;
2. Collecting data on the prices of goods, taking care to note if the price is distorted by taxes or subsidies and, if so, identifying similar goods that are unaffected by such distortions. Care should be taken to acquire price data from a substantial range of time spans, including inter-annual and seasonal variation of prices and socio-economic preferences;
3. Multiplying the price by the change in quantity to determine the value of the change.

Case study

In 1999, the Asian Development Bank estimated that the Marshall Islands subsistence and commercial fisheries to be worth US $3.8 million dollars and US 0.9 million dollars respectively. The FAO reported that fish exports were worth US$473,000 in 1999, and were only for aquaria, constituting approximately 6.2 percent of the total exports. These figures represent the market value of fish caught by the Marshallese in 1999, simply multiplied the tones of live weight by the price at market to arrive at the overall value of the fish, which are mostly tuna. (FAO Fisheries and Aquaculture, Marshall Islands)

Travel cost method

Travel costs valuation is particularly useful for ecosystem level valuation of recreational or leisure destinations, e.g. the value of a given water body for fishing activity. The method is frequently used, but it does depend on a large data set and complex statistical skills, and is gathering information from visitors to recreational sites is very labour intensive.

Process outline

1. Determine total zone from which visitors come to visit the ecosystem, divide into zones of equal distance from recreational area;
2. Analyze within each zone samples to determine the costs incurred in visiting, motivation for going, frequency of visits and socio-economic variables;
3. Obtain visitation rates for each zone, use the info to estimate total number of visitor days per head of local population;
4. Conduct a statistical regression to test the relationship between visitation rates and other variables;
5. Construct a demand curve relating number of visits to travel cost.

Case study

Nunes and Markandya (2008) used a travel cost assessment of visitors to a popular beach in the Netherlands to compare the costs and benefits of developing a dedicated ballast water facility in the Rotterdam harbour. The travel cost assessment consisted of a field worker eliciting information from the beach-goers through a survey, which revealed a loss of €55 per person per year if the beach would have to be closed due to harmful algal blooms. They combined this study with a contingent valuation study that suggested people were willing to pay €76 per year for use of the beach. The welfare loss to the Netherlands if a HAB were to prevent use of the beach was calculated at €326,190,000 or %0.08 of Dutch GDP in 2000. This study does not include the costs of cleaning up the HAB, nor the environmental or health impacts of a HAB, so certainly the costs are even greater. Even if there is double counting in the study, the benefits of preventing a HAB from occurring outweigh the costs of the dedicated ballast water reception facility in Rotterdam harbour, which was contracted and designed in 2008 and will cost approximately €100 million dollars.

4.

ECONOMIC CALCULATIONS AND APPROXIMATIONS

On this chapter, all the calculations and assessments are introduced detaily in order to define the economical extend of the ballast water management activities. This chapter is divided sub sections which covers each of the activities.

4.1 PREPARATORY PHASE COSTS

4.1.1 Capacity Building, Coordination and Communication

On this section the costs for preparing national and international meetings are calculated. The costs are calculated with respect to the national legislation on travel allowances and similar activities done in Turkey within the Globallast Partnership project activities.

a) Introductory Training on Ballast Water Management;

Participation :25 people

Duration :5 days

Table 1: Cost calculation for training

Cost items	Calculation	Total Amounts
Accommodation	25 x5 days x 20 $	2 500 $
Training venue	In kind contribution	In kind contribution
Daily allowance	25 x5 days x 20 $	2 500 $
Training documents	1 000 $	1 000 $
Travel costs	25 x 120$	3 000 $
Trainers	In kind contribution	In kind contribution
Lunches	25 x 10 $ x 5 days	1 250 $
Coffe Breaks	25 x 5 $ x 5 days	625 $
Dinners	25 x 15 $ x 5 days	1875 $
Social Activities	2000 $	2000 $
TOTAL		14 750 $

b) Training on Legal Implementation of the BWM Convention;

Participation :25 people

Duration :5 days

Table 2: Cost calculation for training

Cost items	Calculation	Total Amounts
Accommodation	25 x5 days x 20 $	2 500 $
Training venue	In kind contribution	In kind contribution
Daily allowance	25 x5 days x 20 $	2 500 $
Training documents	1 000 $	1 000 $
Travel costs	25 x 120$	3 000 $
Trainers	In kind contribution	In kind contribution
Lunches	25 x 10 $ x 5 days	1 250 $
Coffe Breaks	25 x 5 $ x 5 days	625 $
Dinners	25 x 15 $ x 5 days	1875 $
Social Activities	2000 $	2000 $
TOTAL		14 750 $

c) Specialized training to the shipping industry (ship- and port-side issues);

Participation :160 people

Duration :5 days

Table 3: Cost calculation for training

Cost items	Calculation	Total Amounts
Accommodation	160 x5 days x 20 $ (participants may cover their own expenses)	16 000 $
Training venue	In kind contribution	In kind contribution
Daily allowance	160 x5 days x 20 $ (participants may cover their own expenses)	16 000 $
Training documents	3 000 $	3 000 $
Travel costs	160 x 120$ (participants may cover their own expenses)	19 200 $
Trainers	In kind contribution	In kind contribution
Lunches	160 x 10 $ x 5 days	8 000 $
Coffe Breaks	160 x 5 $ x 5 days	4000 $
Dinners	160 x 15 $x 5 days	1875 $
Social Activities	2000 $	2 000 $
TOTAL		18 875 $ (if participants may cover their own expenses) 70 075 $

d) Training of Port State Control officers (compliance monitoring and enforcement);

Participation :25 people

Duration :5 days

Table 4: Cost calculation for training

Cost items	Calculation	Total Amounts
Accommodation	25 x5 days x 20 $	2 500 $
Training venue	In kind contribution	In kind contribution
Daily allowance	25 x5 days x 20 $	2 500 $
Training documents	1 000 $	1 000 $
Travel costs	25 x 120$	3 000 $
Trainers	In kind contribution	In kind contribution
Lunches	25 x 10 $ x 5 days	1 250 $
Coffe Breaks	25 x 5 $ x 5 days	625 $
Dinners	25 x 15 $ x 5 days	1875 $
Social Activities	2000 $	2000 $
TOTAL		14 750 $

e) Training on Port Biological Baseline Surveys

Participation :25 people

Duration :5 days

Table 5: Cost calculation for training

Cost items	Calculation	Total Amounts
Accommodation	25 x5 days x 20 $	2 500 $
Training venue	In kind contribution	In kind contribution
Daily allowance	25 x5 days x 20 $	2 500 $
Training documents	1 000 $	1 000 $
Travel costs	25 x 120$	3 000 $
Trainers	In kind contribution	In kind contribution
Lunches	25 x 10 $ x 5 days	1 250 $
Coffe Breaks	25 x 5 $ x 5 days	625 $
Dinners	25 x 15 USD x 5 days	1875 $
Social Activities	2 000 $	2000 $
Diving Equipment	3 000 $	3 000 $
Laboratory Equipment	3 000 $	3 000 $
TOTAL		20 750 $

4.1.1.1 National task force meetings

Participation :25 people

Duration :1 day

This would be a 1 day meetings which will be organized 1 per year.

Table 6: Cost calculation for meeting

Cost items	Calculation	Total Amounts
Accommodation	25 x1 day x 20 $	500 $
Training venue	In kind contribution	In kind contribution
Daily allowance	25 x1 day x 20 $	500 $
Training documents	1 000 $	1 000 $
Travel costs	25 x 120 $	3 000 $
Trainers	In kind contribution	In kind contribution
Lunches	25 x 10 $ x 1 day	250 $
Coffe Breaks	25 x 5 $ x 1 day	125 $
Dinners	25 x 15 $x 1 day	375 $
TOTAL		5 750 $

4.1.1.2 Regional task force meetings

Regional task force meetings are organized under the activities of the regional organizations such as REMPEC or Black Sea Commission. The cost of these meetings is covered under the budget of these organizations. Also there are funding sources to tap into, such as the IMO Integrated Technical Cooperation Programme. On the below table the cost of these meetings are calculated.

Participation :25 people

Duration :5 days

Table 7: Cost calculation for meeting

Cost items	Calculation	Total Amounts
Accommodation	25 x2 days x 100 $	5 000 $
Training venue	7000 $	7 000 $
Daily allowance	25 x 2 days x 250 $	12 500 $
Training documents	1 000 $	1 000 $
Travel costs	25 x 1000 $	25 000 $
Lunches	25 x 40 $ x 2 days	2 000 $
Coffe Breaks	25 x 15 $ 2 days	750 $
Dinners	25 x 55 $ x 2 days	2 750 $
Social Activities	4000 $	4 000 $
Interpretation	5 000 $	5 000 $
TOTAL		65 000 $

4.1.2 Legislative, policy and institutional reform costs

4.1.2.1 National BW status assessment

Turkey prepared the status assessment report with the funds of Globallast Partnership Project. Although the cost is calculated for this activity on the below table for the case that national sources were used.

Table 8: Cost calculation for consultancy

Relevant Personnel	Time for Study	Fee for the expert
Expert on Shipping Industry	1 month	3 000 $ /month = 3000$
Expert on Marine and Coastal Environment	3 months	3 000 $ /month = 9000$
Expert on Invasive Species	2 months	3 000 $ /month = 6000$
TOTAL		18 000 $

4.1.2.2 Economic assessment

Turkey prepared the economic assessment report with the funds of Globallast Partnership Project. Although the cost is calculated for this activity on the below table for the case that national sources were used.

Table 9: Cost calculation for consultancy

Relevant Personnel	Time for Study	Fee for the expert
Expert on Shipping Industry	1 month	3 000 $ /month = 3000$
Expert on Economics	3 months	3 000 $ /month = 9000$
TOTAL		12 000 $

4.1.2.3 Developing a national BWM Strategy

Turkey prepared the BMW Strategy document with the funds of Globallast Partnership Project. Although the cost is calculated for this activity on the below table for the case that national sources were used.

Table 10: Cost calculation for consultancy

Relevant Personnel	Time for Study	Fee for the expert
Expert on Legislations	3 month	3 000 $ /month = 9000$
Expert on administrative infrastructure	3 months	3 000 $ /month = 9000$
Expert on Invasive Species	2 months	3 000 $ /month = 6000$
TOTAL		24 000 $

4.1.2.4 Legislative review and implementation

Turkey prepared the draft national legislations within the national ballast water management project. On the below table the cost of this activity is calculated.

Table 11: Cost calculation for consultancy

Relevant Personnel	Time for Study	Fee for the expert
Expert on Legislations	3 month	3 000 $ /month = 9000$
Expert on administrative infrastructure	3 months	3 000 $ /month = 9000$
Expert on Invasive Species	3 months	3 000 $ /month = 9000$
Expert on Shipping Industry	3 months	3 000 $ /month = 9000$
TOTAL		36 000 $

4.1.3 Port Biological Baseline Surveys (research and monitoring)

The cost of the PBBS Study is calculated with an estimation of choosing 5 high risk areas on Turkish coasts for repeat the study 2 times.

Table 12: Cost calculation for service

Cost items	Calculation	Total Amounts
Accommodation	6 x 2 days x 100 USD	1 200 $
Travel expenses	3 000 USD	3 000 $
Taxonomist	2 days x3000 USD	6 000 $
Divers	2 days x 2divers x 3000 USD	12 000 $
Diving Equipment	3 000 USD	3 000 $
Laboratory Equipment	3 000 USD	3 000 $
TOTAL		28 200 $ x 5 x2 = 280 200 $

4.1.4 Risk Assessments

Turkey made the risk assessment study within the national ballast water management project. On the below table the cost of this preparing activity is calculated.

Table 13: Cost calculation for consultancy

Relevant Personnel	Time for Study	Fee for the expert
Expert on Risk Assessment	3 month	3 000 $ /month = 9000$
Expert on Data Bases	3 months	3 000 $ /month = 9000$
Expert on Invasive Species	3 months	3 000 $ /month = 9000$
Expert on Shipping Industry	3 months	3 000 $ /month = 9000$
Software		5 000 $
Hardware		3 000 $
TOTAL		44 000 $

4.2 COMPLIANCE-RELATED COSTS

4.2.1 Flag State Obligations

4.2.1.1 Establishing procedures for issuing BWM Certificate

There are 1236 personnel are working in Undersecretariat for Maritime Affairs of Turkey in order to enhance maritime safety and environmental protection. There are 195 inspection personnel are working on the district directorates and harbor masters of Turkey. There is an existing maritime management system is going on in Turkey. The below calculations are made in order to find the economical overhead of the ballast water management activities.

It is planned to give an authorization to the Lloyds on Turkey for the issuing the ballast water management certificate to the ships. The cost for this process is going to be reimbursed from ships by Llyods.

Table 14: Cost calculation for service

Cost Items	Calculation	Total Amounts
Establishing certification requirements	Llyods will give the certificates with a service charge 2500 $ x 1525 Turkish flagged ships	3 812 500 $
Communication of requirements and procedures to the shipping industry and IMO	Chamber of Shipping will communicate and coordinate with sector. UMA will communicate with IMO.	No Cost
Maintenance of records of issued Certificates	Lloyds will give this service including the service charge for establishing certificates.	No Cost

4.2.1.2 Approval of ships' BWM Plans

It is planned to give an authorization to the Lloyds on Turkey for approval of the ballast water management plans of the ships. The cost for this process is going to be reimbursed from ships to Llyods.

Table 15: Cost calculation for service

Cost Items	Calculation	Total Amounts
Training of Staff	Llyods will train their staff	No cost
Establishing protocols for vetting and approving BWM Plans.	UMA will give responsibility to Llyods with no cost	No Cost

4.2.1.3 Type approval of BWM systems

It is planned to give an authorization to the Lloyds on Turkey for giving type approvals to the treatment facilities. The cost for this process is going to be reimbursed from companies to Llyods.

Table 16: Cost calculation for service

Cost Items	Calculation	Total Amounts
Review of the technical reports and test results	LLyods will give the certificates with a service charge 15 000 $ / per ship x1525 Turkish Flagged ships	22 875 000 $

4.2.1.4 Surveys (Initial, Renewal, Intermediate, Annual, Additional)

It is planned to give an authorization to the Lloyds on Turkey for giving type approvals to the treatment facilities. The cost for this process is going to be reimbursed from companies to Llyods.

Table 17: Cost calculation for service

Cost Items	Calculation	Total Amounts
Initial, Renewal, Intermediate, Annual surveys	LLyods will give the certificates with a service charge Initial: 2500 $ Renewal: 2500 $ Intermediate: 2000 $ Annual: 1500 $ Total=8500$ x 1525 Turkish Flagged Ships	12 962 500 $

4.2.1.5 Approval of exemption applications

UMA is the responsible authority for approving the exemption applications

Table 18: Cost calculation for service

Cost Items	Calculation	Total Amounts
Exemption application	UMA is Responsible	No Cost

4.2.1.6 Training of crew members

Table 19: Cost calculation for training

Cost Items	Calculation	Total Amounts
Training Cost	The Seaman takes relevant certificates for education or the company of the ship give the fees for education	The cost of this activity is included to the industry obligations

4.2.2 Port State Obligations

4.2.2.1 Compliance monitoring and enforcement (CME)

No additional cost is defined under the CME activities. All the cost of compliance and enforcement activities will be included to the Inspection of ships.

4.2.2.2 Inspection of ships

Table 20: Cost calculation for service

Cost Items	Calculation	Total Amounts
Port State Cost (Inspection of Ships)	35 000 calls Turkish ports annually %10-15 of them surveyed = 4500 ships per year 1 surveyor gets 1600 $ per month and surveys 30 ships per month = 53 $ per ship 2 surveyors per survey x 53 $ per ship x 4500 ships per year =477 000$ per year	477 000$ per year

4.2.2.3 Sampling

1) **Sampling for compliance with D-1 standard**

Table 21: Cost calculation for equipment

Cost Items	Calculation	Total Amounts
Salinometer	150 $ x 70 Harbor Masters	10 500 USD

2) **Sampling to ensure D-2 compliance.**

Table 22: Cost calculation for service

Cost Items	Calculation	Total Amounts
Equipment	3 000 $ x 7 District Directorate	21 000 $
Taxonomist	3000$ per month x 12	36 000 $
Laboratory coast	3000$ per month x 12	36 000 $
TOTAL		93 000 $

4.2.2.4 Sediment reception facilities

Waste handling costs calculated with respect to current tariff's in Turkey

Table 23: Cost calculation for service

Cost Items	Calculation	Total Amounts
Waste Handling	300 $/m^3 x 1000 tonnes per year	300 000 $

4.2.2.5 Communication of requirements to IMO and other member states

Nearly zero

4.2.2.6 Communication of BWM requirements to ships

Nearly zero

4.2.2.7 Designation of areas for Ballast Water Exchange

Table 24: Cost calculation for consultancy

Relevant Personnel	Time for Study	Fee for the expert
Expert on Risk Assessment	3 month	3 000 $ /month = 9000$
Expert on Hydrodynamics of Sea Water	3 months	3 000 $ /month = 9000$
Expert on Invasive Species	3 months	3 000 $ /month = 9000$
Expert on Shipping Industry	3 months	3 000 $ /month = 9000$
TOTAL		36 000 $

4.2.3 Industry obligations

4.2.3.1 Training of crew members (IMO model courses, etc)

Table 25: Cost calculation for training

Cost Items	Calculation	Total Amounts
Training of the personnel	250 $ per staff x 37.467 Turkish seafarers	9 336 750 $

4.2.3.2 BWM Plans

Table 26: Cost calculation for service

Cost Items	Calculation	Total Amounts
Service fee of the Lloyds	2500 $ per ship x 1525 Turkish flagged ships	3 812 500 $

4.2.3.3 BWM Record Books

No additional cost

4.2.3.4 BWM options

BW Treatment

Table 27: Cost calculation BW treatment

Cost Items	Calculation	Total Amounts
Treatment equipment	500 000 $ per ship (mean value) x 1525 Turkish flagged ships	762 500 000 $
Operational cost	0,01 $ per tons of ballast water (mean value) x 23,000,000 tons ballast discharged to Turkish ports annually	230 000 $

BW Exchange

Table 28: Cost calculation BW exchange

Cost Items	Calculation	Total Amounts
Operational cost	0,05 $ per tons of ballast water (mean value) x 23,000,000 tons ballast discharged to Turkish ports annually	1 150 000 $

4.3. OTHER ISSUES NOT COVERED BY THE CONVENTION

4.3.1 Port Biological Monitoring Programmes

The main problem of the port biological monitoring programmes is the sustainability. Funding mechanism is most difficult part. There is a synergy is needed between stakeholders. It is very difficult to carry on this system with a project based approach because monitoring programmes have to carry on continuously. There can be no project could be defined continuously.

The solution is to combine the port biological monitoring with other environmental monitoring studies and establish a combined system. The cost for port biological monitoring system cannot be calculated easily because of this nature.

But as an example for calculating the extent of the work the below mentioned calculation was made. The monitoring has to be replicated on 4 times a year. (Spring, summer, autumn and winter),

Table 29: Cost calculation for service

Cost items	Calculation	Total Amounts
Accommodation	6 x 2 days x 100 USD x 4 seasons	4 800 $
Travel expenses	3 000 USD x 4 seasons	12 000 $
Taxonomist	2 days x3000 USD x 4 seasons	24 000 $
Divers	2 days x 2divers x 3000 USD x 4 seasons	48 000 $
Diving Equipment	3 000 USD x 4 seasons	12 000 $
Laboratory Equipment	3 000 USD x 4 seasons	12 000 $
TOTAL		2 256 000 $/per 20 port

4.3.2 Port BWM Plan development

Table 30: Cost calculation consultancy

Cost Items	Calculation	Total Amounts
Expert on Ballast Water Implementations	3000$ per month x 3 months	1 440 000 $ /per 160 major ports

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RESULTS

The results found from the calculations on the section 4 are reported on this section within below tables:

Direct Use Values Key Sectors	Total yield/catch/#users etc (where applicable)	# employed or dependent	Total Value of Sector	Total Value of sector as % of GDP	Vulnerability to IAS (high, medium, low)	% loss (worst case scenario)	$ loss (worst case scenario)
Fisheries	645 000 Ton/year fish catch %0,7 of world production (2004)	25 000 Registered Fisherman	1.6 billion TL	0,4%	High	%60 loss in fish stocks in mnemiopsis leidy case	More than 1 Billion USD Loss in mnemiopsis leidy case
Aquaculture	94 000 Ton/year fish production %32 of world production (2004)	7 100 workers in fish farms	512 million TL	0,13%	High	%80 can be lost if the ecosystem is changed	409 million $
Coastal Tourism	Bed capacity: 714 000 Hotels 9000 Yatchs 21 million tourists per year %2,5 of the world capacity 13th plce in world ranking (2004)		18 billion $	6%	High	%30 can be lost if the ecosystem is changed	5,4 billion$

Additional Costs to Society or Industry	# employed or dependent	Total Value of Sector	Total Value of sector as % of GDP	Vulnerability to IAS (high, medium, low)	Type of costs possible incurred	$ cost (worst case scenario)
Shipping	142.687 Registered seaman in Turkey	224.776.283 tons of cargo handled on 2008 1.525 Turkish Flagged ships	NA	low	None	None
Coastal infrastructure	160 major ports		NA	low	None	None
Public Health	**IAS Species (with potential human health impact)**	**Possible impact pathways (e.g. food, water, recreation etc.)**	**Possible impacts (food poisoning, physical harm etc.)**	**# affected (worst case scenario)**	**Treatment costs per person**	**$ cost (worst case scenario)**
Vulnerable groups	Poisonous algaes,	Food, water	Poisoning	More than 10% of the population 7 million people	200 $	1,4 billion $
	Pathogens like cholera	Water, recreation	Epidemic Diseases			

Issue	Obligation to whom Flag/port/industry (specify)	Cost to whom Flag/port/industry (specify)	Type of cost (cash/time in kind, etc)	Estimated cost ($)	Possible source of funding or funding mechanism (if applicable)
PREPARATORY PHASE					
Capacity building, education and communication					
National Task Force Meetings	**UMA**	**UMA**	**Cash and in kind**	**5 750$/year**	
Training (CME, PBBS, etc)	**UMA**	**UMA**	**Cash and in kind**	**135 075 $**	
Regional Task Force meetings	**UMA**	**UMA**	**Cash and in kind**	**65 000$ / 2 year**	
Legislative, Policy and Institutional Reform					
National BW Status Assessment	**UMA**	**UMA**	**Cash**	**18 000$**	
Economic Assessment	**UMA**	**UMA**	**Cash**	**12 000$**	
National BWM Strategy	**UMA**	**UMA**	**Cash**	**24 000$**	
Legal review and drafting	**UMA**	**UMA**	**Cash**	**36 000$**	

Port Biological Baseline Studies (research and monitoring)	**UMA**	**UMA**	**Cash and in kind**	**280 200$**
Risk Assessments	**UMA**	**UMA**	**Cash and in kind**	**44 000$**
COMPLIANCE RELATED COSTS				
Flag State Obligations	**UMA**	**Industry**	**In kind**	**None**
Establishing procedures for issuing BWM Certificate				
Approval of ships' BWM Plans	**UMA**	**Industry**	**cash**	**3 812 500 $**
Type Approval of BWM Systems	**UMA**	**Industry**	**cash**	**22 875 000 $**
Surveys	**UMA**	**Industry**	**cash**	**12 962 500$**
Approval of exemptions	**UMA**	**Industry**	**none**	

Port State Obligations				
Compliance Monitoring and Enforcement	**Port**	**No additional cost**		
Inspection of ships	**Port**	**Port**	**Time, in kind**	**477 000 $ per year**
Introduction of BW reporting form	**Industry**	**No additional cost**		
Sampling	**Port state**	**Port state**	**Cash**	**93 000 $ per year**
Sediment reception facilities	**Industry**	**Industry**	**Cash**	**300 000$ per year**
Communication of requirements to IMO and other member states	**Port state**	**Port state**	**Time, in kind**	**None**
Communication of BWM requirements to ships	**Port state**	**Port state**	**Time, in kind**	**None**
Industry Obligations				
Training of crew members	**Industry**	**Industry**	**Cash/time**	**9,336,750 $**

BWM Plans	**Industry**	**Industry**	**Cash/time**	**3,812,500 $**
BWM Record Books	**Industry**	**Industry**	**Cash/time**	**No add cost**
BWM options				
BW Exchange (D-1)	**Industry**	**Industry**	**Cash/time**	**1,150,000 $**
BW Treatment (D-2)	**Industry**	**Industry**	**Cash/time**	**762,500,000$**
Port biological monitoring programmes	**Port state**	**Port state**	**Cash/ time**	**18 048 000 $**
Port BWM Plan development	**Port**	**Port**	**Cash/time**	**1 440 000 $**

6.

CONCLUSIONS

The results show that the operational cost of ballast water management system is definitely cheaper than the cost of possible harms of the invasive alien species. Also it has to be mentioned that only the economical lost from invasive alien species was calculated. The economical assessment methodology could not assess the economical impact to culture, human sociology and psychology. Also the cost of the possible cleaning activities for AIS is not in the scope of this report.

Table 31: Results

Possible Economical Effect of AIS to TURKEY	**8.16 Billion $ (worst case)**
Operating Cost of BWM to port state	40.9 million $
Operating Cost of BWM to industry	781 million $
Total Cost of BWM	**821.9 million $**

If we also include the lost on “cultural value” of the living place to the amount of possible effect of AIS then the difference between operating cost to the possible economical effects of AIS will increase. We can easily define that ballast water management activities are feasible with respect to the comparison between costs and lost.

Table 32: Results

OPERATIONAL COSTS	Cost	%
Capacity building	$205.825	0,03
Legislative, Policy and Institutional Reforms	$414.200	0,05
Flag State Obligations	$39.650.000	4,82
Port State Obligations	$916.500	0,11
Industry Obligations	$780.755.250	94,99
TOTAL	$821.941.775	

The operational cost for ballast water management effects %5.01 the flag state and %94.99 the industry.

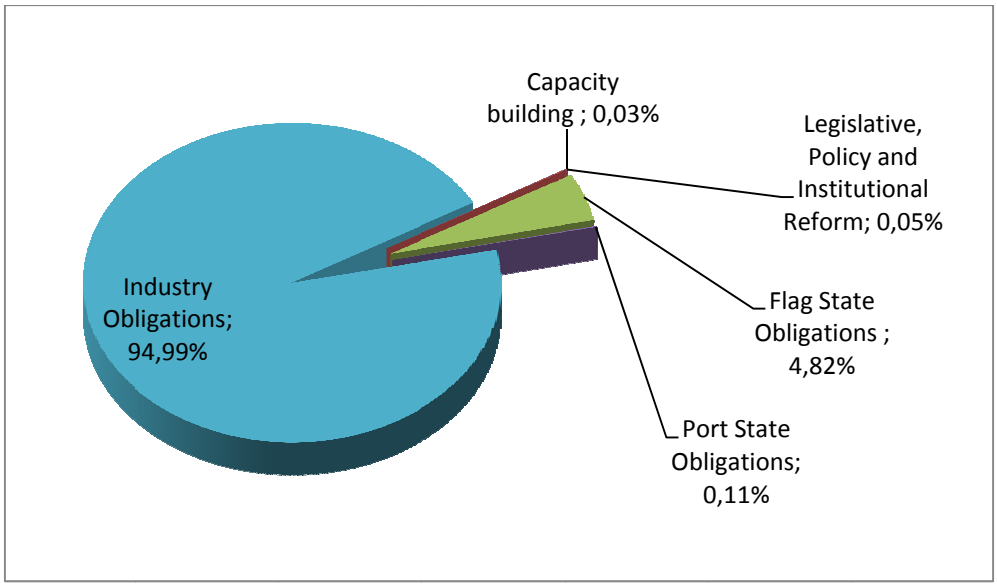

Figure 1. Percentages of operational costs

Also when we look at to the cost items for industry we can see that %97.7 of the cost for industry is ballast water treatment. This is an obligation under the BWM Convention. All the ships have to treat their ballast water with respect to standards concerned in the convention

Table 33: Results

INDUSTRY OBLIGATIONS	Cost	%
Training of Crew Members	$9.336.750	1.19
BMW Plans	$3.812.500	0.48
BW Exchange	$1.150.000	0.14
BM Treatment	$762.730.000	97.69
Port Bio. Monitoring Prog.	$2.256.000	0.28
Port BWM Plan Dev.	$1.440.000	0.18
TOTAL		$780.775.250

It is calculated that the %92.79 of all operational cost is ballast water treatment.

Table 34: Results

INDUSTRY OBLIGATIONS	Cost	%
Ballast Water Treatment	$762.730.000	92.79
Other Activities	$59.221.775	7.2
All Operational Cost		$821.941.775

As a conclusion this economical assessment study shows that the ballast water management activities are feasible to implement. The total cost for the activities beside treatment is 59.2 million $. This amount could be achieved in Turkey in order to counteract such a huge threat of AIS.