



UNIVERSITI PUTRA MALAYSIA

**ECONOMICS OF REGULATORY COMPLIANCE
IN THE FISHERIES OF INDONESIA, MALAYSIA
AND THE PHILIPPINES**

INDAH SUSILOWATI

FEP 1998 7

**ECONOMICS OF REGULATORY COMPLIANCE
IN THE FISHERIES OF INDONESIA, MALAYSIA
AND THE PHILIPPINES**

INDAH SUSILOWATI

**DOCTOR OF PHILOSOPHY
UNIVERSITI PUTRA MALAYSIA**

1998



**ECONOMICS OF REGULATORY COMPLIANCE
IN THE FISHERIES OF INDONESIA, MALAYSIA AND
THE PHILIPPINES**

BY

INDAH SUSILOWATI

**Dissertation Submitted in Fulfilment of the Requirements for the
Degree of Doctor of Philosophy in the Faculty of Economics and
Management, Universiti Putra Malaysia**

May 1998



This Dissertation is dedicated to my beloved:

Late father, Haji Achmad S. Darminto,

My mother, Haj

My brothers and sisters,

My perpetual husband, Waridin,

My Sweet children, Dinda Saraswati Ratnaningsih, and

Dimas Susilo Waridiarto,

Simbah 'Kung and 'Ti Pernalang.



ACKNOWLEDGMENTS

I wish to thank the Dean and the entire members of the Faculty of Economics and Management for providing the opportunity and assistance during my graduate study at UPM.

I extend my sincere gratitude to my committee chairman, Associate Professor Dr. K. preparation of this dissertation. Despite his tight work schedule he had time for discussion and deliberation of the various aspects of this study.

My deep appreciation is accorded to Professor Dr. Nik Mustapha Raja Abdullah, the Deputy Dean for Graduate Studies and Research, Faculty of Economics and Management and a member of my supervisory committee. His contribution in providing crucial suggestions and constructive criticisms were valuable to this study.

My heartfelt appreciation and gratitude goes to Associate Professor. Dr. Ahmad Zubaidi Baharomshah, a member of my supervisory committee for his constructive insight on data analysis. His knowledge of econometric modelling was greatly valuable especially in the construction of the limited dependent model.

The ideas and suggestions of Professor. Dr. Jon G. Sutinen in the early stage of proposal preparation helped me to figure out more clearly the model used in this dissertation. I also highly appreciate Dr. Robert S. Pomeroy for his useful comments and suggestions on the earlier draft of this dissertation.



The comments and suggestions of Professor. Dr. Ishak Hj. Omar and Associate Professor. Dr. Tai Shzee Yew as the external examiners for my qualifying examination on the research proposal were helpful in improving the quality of this dissertation. My deepest appreciation to Professor Dr. Mohd. Ariff A. Hussein who graciously volunteered his time to proof-reading the manuscript despite his heavy work schedule. I am also thankful to Associate. Professor. Dr. Ahmad Shuib, the Head of Department of Natural Resource Economics, for his comments and suggestion on the model during my qualifying examination. My deep appreciation also goes to Professor Dr. Mohd. Ghazali Mohayidin, Deputy Dean of GSO UPM, a member of the Board of Examiners for my viva, for his useful insights and encouragement.

My sincere gratitude is also extended to SEARCA for providing me a thesis grant award and Associate Professor Dr. Kamis Awang, Dean of GSO UPM, for helping me in securing this grant. I am also indebted to ICLARM for supporting the project under the World Wide Collaborative Project on Co-Management; and Universitas Diponegoro (UNDIP) for granting me the study leave. My gratitude are also extended to the Dean and entire members of the Faculty of Economics at UNDIP;

Fisheries Analysis (IFA) at Simon Fraser University (SFU), Canada, encouragement in getting me to pursue Ph.D. study. I would like to extend my thanks to Dr. Tommy

Studies in Bandung, Indonesia for his useful ideas on resource-based management. My appreciation goes to Dr. Victor Nikijuluw for sharing information on the fisheries research activities in Indonesia.



My special thanks are also due to the Provincial, Pati, Pekalongan and Pemalang Fisheries Offices in Central Java, KUD Misoyo Sari Pemalang and KUD Saroni Mino Juwana for providing permission to utilise their data for this study. I am indebted to its officers namely, Mr. Tjiptono, Ir. Ramdon, Ir. Djoko Setiadji, Mr. Abu Sujanggi, Drs. Syafei, Ir. Hadi and Edy, All of them helped me with data collection. I wish also to thank Dr. Ida Siason and Dr. Cynthia Ticao from UPV, Philippines for facilitating the data collection in Philippines. My appreciation is also due to my students, Evi, Melik, Ari, Totok, Aris, Ruli, Susy and Farhan for helping me to collect data in Indonesia; Malaysia.

I owe a great deal of gratitude to Mr. Kusairi Mohd. Noh for sharing knowledge of the SPSS package, Alias Radam for his points of view on programming the limited dependent model using SHAZAM and LIMDEP; thanks also to Mrs. Robi Saad for providing me computer assistance. My special thanks to Zalila Samsudin for sharing her friendship during my stay at UPM. My sincere thanks are also given to Dr. Abu Hassan, En. Razali, En. Zol, En. Dahari, En. Hisyam, Kak Kam, Kak Ani, Kak Nap, Kak Baizura and Kak Edah for their cooperation during my stay.

My regards are due to Ms. Fadzlon Yusof and Mrs. Arbaiyah for editing the thesis format; and Mr. Abdul Aziz Faridah in Graduate School Office UPM. I am also grateful to my friends, Ahmed Elyas, Linda, Ahlam for sharing their opinion and friendship with me. My thanks also goes to my post graduate colleagues: Mustain Bilah, Suhail, Khalid, Hussein, Rasyid, Bilal, Taufiq, Fauziah, Chalah and Inaam. My Indonesian friends at UPM,



especially to Mr. Enisar Sangun and family, Mr.
and family,
family as well as Mr. Mulyadi and Mrs. Nunik,
Sumber,
friendship and sympathy during my stay in UPM. To the many individuals,
too many to be acknowledged in name individually but who have contributed directly
and indirectly to the successful completion of this study, I affirm

Finally, my
also busy with his own dissertation he gave his time to accompany me always to seek
information and data. He also helped me in data entry. Without his wholehearted
support,
deal to the entire members of my family in Semarang and Pemalang for their
overwhelming support,
absence from them. I appreciate my brother in law, Ir. Partha who prepared a map
for me in spite of his busy schedule. My daughter Dinda and my son Dimas whom I
left at home with Mak Nah since morning till evening during the entire period of my
study in Malaysia deserve appreciation. I will remember her patience in looking after
my children. My children's lost hours of love can hardly be compensated. I preserve
all my love for them. It is their perpetual love and encouragement which inspired me
to complete my doctoral degree.

Most of all, to
need in life,



TABLE OF CONTENTS

ACKNOWLEDGEMENTS	iii
LIST OF TABLES	x
LIST OF FIGURES	xi
ABSTRACT	xii
ABSTRAK	xiv
 CHAPTER	
I INTRODUCTION	1
Background	1
Statement of the Research Problem	4
Ob	8
Significance of the Study	8
II GENERAL DESCRIPTION OF THE FISHERIES IN INDONESIA, MALAYSIA AND THE PHILIPPINES	10
Indonesia	10
Fisheries Resource and Output	11
Fishing Gears	17
Employment	18
Fisheries Regulations and Policies	19
Institutional Framework and Enforcement Programme	24
Malaysia	32
Fisheries Resource and Output	34
Fishing Gears and Landings	34
Employment	38
Fisheries Regulations and Policies	39
Enforcement Programmes	42
The Philippines	59
Fisheries Resource and Output	60
Fishing Gears	65
Fisheries Regulations and Policies	66
III LITERATURE REVIEW	71
Early Studies of Criminal Behaviour	71
The Economic Theories of Criminal Behaviour	74
The Other Models:	81
Ehrlich's Model	81
Block and Heineke's Model	82
Empirical Studies on Tax Compliance	85
Empirical Studies from Others Social Sciences	91
Empirical Studies in the Fishery	95



IV	FRAMEWORK OF ANALYSIS	102
	Analysis with the Absence of Zoning Regulation	102
	Analysis with the Presence of Zoning Regulation	105
	The Total Condition: Governing Individual's Violation Behaviour	106
	The Marginal Condition: Governing Individual's Violation Behaviour	107
	Analysis with Inclusion of Morality and Social Vectors	113
	Intrinsic Factors of Violation: Moral Standing (h) and Legitimacy (l)	113
	Extrinsic Factor of Violation: Social Standing (v)	117
	Comparative Static's Analysis	120
	Total Condition	120
	Marginal Condition	122
V	METHODOLOGY	127
	Theory	127
	The Basic Violation Model	127
	Estimation Techniques	132
	Econometric Model	137
	Estimation	146
	Statistical Consideration	148
	Measurement of Data	148
	Criteria of Model Selection and Expected Results ...	151
VI	THE STUDY AREA AND THE DATA	153
	Selection of the Study Area	153
	Sampling Method and Sample Size	154
	Questionnaire	157
	Standardisation of Data	158
	Data Assessment	160
	Test of Reliability on Legitimacy Variables	160
	Missing Responses	161
	Brief Profiles of the Study Area	162
	Profile of Respondents	162
	Profile of Fleets and Catch	163
	Profile of Surveillance Activities	164
VII	RESULTS AND DISCUSSION	167
	Selection of the Model	169
	The Selected Model	176
	Basic Deterrence Model of Compliance	176
	Enriched Model of Compliance	178
	Intensity of Violation Model	183
	Basic Deterrence Model of Compliance	185
	Enriched Model of Compliance	186
	Legitimacy Variables	187
	Synthesis of the Findings	190

VIII	CONCLUSIONS AND RECOMMENDATIONS	192
	Summary and Conclusion	192
	Policy Implications and Recommendations	193
	Probability of Detection and Conviction	193
	Economic Gain from Inshore and Offshore	195
	Moral development	196
	Social Environment Influence	197
	Legitimacy	197
	Recommendations for Further Studies	198
	BIBLIOGRAPHY	200
	APPENDICES	
A	STATISTICS OF PHILIPPINES: PRODUCTION OF THE FISHERIES SECTOR, 1978-1987	211
B ₁	COMPARATIVE STATICS: THE TOTAL CONDITION WITH THE CHANGE IN THE RESPECTIVE VARIABLE(S)	212
B ₂	COMPARATIVE STATICS: DERIVATION OF THE MARGINAL CONDITION	214
C	LIKELIHOOD RATIO TEST FOR THE RESTRICTED AND UNRESTRICTED MODELS	228
D	ZERO-ORDER CORRELATION MATRIX	230
E	THE COUNTRY MODELS	232
F	SPECIMEN QUESTIONNAIRE	237
G	RAW DATA OF THE OPERATIONAL VARIABLES	252
H	PROGRAMME FOR ESTIMATION USING SHAZAM PACKAGE	296



LIST OF TABLES

No.	Title	Page
1.1	Description of Zoning Regulation in Indonesia	3
2.1	Role of Agriculture in the Indonesian Economy	14
2.2	Projected Fisheries Production in REPELITA VI	16
2.3	Fisheries Production by Island, 1992	16
2.4	Fisheries Households by Island, 1992	19
2.5	Key Indicators of Fisheries Role in the Malaysian Economy, 1970-2000	35
2.6	Licensed Fishing Vessels in Peninsular Malaysia by Type of Boat, 1970-1994	36
2.7	Licensed Fishing Vessels in Malaysia by State As of 1994	36
2.8	Number of Licensed Fishing Gears in Peninsular Malaysia As of 1994	37
2.9	Marine Landings in Peninsular Malaysia As of 1994	38
2.10	Number of Fishers Working in Licensed Vessels in Malaysia As of 1994	39
2.11	Elements of the Malaysian Fisheries Enforcement System in Malaysia	44
2.12	Statistics of Domestic Fishing Vessels Violation, 1985-1991	53
2.13	Statistics of Malaysia, Number of Arrests of Domestic Vessels, 1993	54
2.14	Enforcement Resource for Regional and Area Centres	57
2.15	Public Expenditure on Fisheries Development and Enforcement ...	58
2.16	Fishing Regions of the Philippines	62
2.17	Estimated Production Potential of Fishing Areas for 1983-1984	64
2.18	Fish Production in Region VI by Province As of 1988	65
5.1	Code, Definitions and Measurement of Operational Variables Used in the Models	140
5.2	Specification of Data Measurement by Scenario	149
5.3	Nature and Expected Signs for the Model	152
6.1	Distribution of Samples by Gears and Country	155
6.2	Reliability Analysis of Legitimacy Variables.....	161
6.3	Descriptive Statistic of Fishing Profile in the Study Area	165
7.1	Probit Estimation of Violation Decision with Intercept Dummy ...	172
7.2	Probit Estimation of Violation Decision: Model with Intercept and Slope Dummies	174
7.3	Probit Estimation of Violation Decision: the Selected Model	177
7.4	Tobit Estimation of Intensity of Violation	184



LIST OF FIGURES

No	Title	Page
2.1	Map of South East Asia Showing the Countries in the Study	12
2.2	Map of Java Island Showing the Study Areas	13
2.3	The General Structure of the Maritime Administration and Policy in Indonesia	29
2.4	The Strategic Structure of Marine Enforcement in Indonesia	31
2.5	Map of Peninsular Malaysia Showing the Study Area	33
2.6	The Structure of the Maritime Policy and Security Arrangements ..	47
2.7	Fisheries Enforcement Procedure	52
2.8	Map of Panay Island, Philippines Showing the Study Areas	61
3.1	Risk Aversion and Participation in Crime	77
4.1	Profit Maximising Problem in the Absence of Zoning Regulation ..	104
4.2	Expected Profit Maximisation in the Presence of Zoning Regulation: Case of Increase in Marginal Probability of Detection (p) or Penalty (PEN)	110
4.3	Expected Profit Maximisation with Zoning Regulation: Case of Decrease in Marginal Probability of Detection (p) or Penalty (PEN)	112
5.1	Framework of Estimation	150
6.1	Sampling Procedure	156



Abstract of dissertation submitted to the Senate of Universiti Putra Malaysia in fulfilment of the requirements for the degree of Doctor of Philosophy.

**ECONOMICS OF REGULATORY COMPLIANCE IN THE FISHERIES
OF INDONESIA, MALAYSIA AND THE PHILIPPINES**

By

INDAH SUSILOWATI

May 1998

Chairman : Associate Professor Dr. K. Kuperan Viswanathan
Faculty : Economics and Management

This study examines non compliance behaviour of fishers with a zoning regulation under a condition of limited enforcement in the fisheries of Indonesia, Malaysia and the Philippines. Rational utility theory is used as a framework for explaining compliance behaviour. A stratified random sample of 568 fishers from Pekalongan and Juwana in Indonesia, Kuala Kedah, Kedah in Malaysia and Conception, Ilo-ilo City, Roxas City and Tigbauan in the Philippines are used in the analysis. Fishing effort and fish landings from the various gears in the three countries were standardised using the geometric index approach.

Economic models of non compliance behaviour using Logit, Probit and Tobit techniques were estimated. The results indicated that economic, morality and social influence factors determined the violation decision of individual fishers to fish in the prohibited area. Some of the legitimacy variables failed to influence the violation decision of respondents in the study. The legitimacy variables were not as important as the moral development variable in explaining the compliance behaviour. This



result is consistent with the findings of Paternoster et. al. (1984) that morality has a stronger influence on law breaking behaviour and compliance rather than legitimacy. Nevertheless, the reliability test for the 12 legitimacy variables were good with overall Cronbach's alpha of 73.7%. In general the findings of the study were consistent with the theoretical model of compliance behaviour developed in Chapter IV and the related literature reviewed in Chapter III.

In practice, probability of detection were low and violation rates were high especially for Indonesia and the Philippines given their limited resources for enforcement and a large geographical area to monitor. In theory, the level of compliance can be improved by increasing the probability of detection and conviction or penalties rate. This can be done by either improving the enforcement process and/ or its intensity. However, it is not very practical because of large financial requirements. To improve fishers' compliance in the study area there is a need to use other determinants of compliance such as morality and social influence factors.

In Indonesia and the Philippines, enforcement institutions are not as well established as in Malaysia. Therefore, institutions of enforcement should be given priority in Indonesia and the Philippines. In Malaysia a fairly well developed enforcement institutions exist, thus in this case there is a need to enhance the scheme and implement enforcement more effectively. To improve compliance, fisheries management authorities should also explore alternative approaches for managing fisheries. One such approach is the co-management approach.

Abstrak disertasi yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi syarat dikurniakan Ijazah Falsafah Kedoktoran.

**EKONOMI PEMATUHAN PERATURAN PERIKANAN
DI INDONESIA, MALAYSIA DAN FILIPINA**

Oleh

INDAH SUSILOWATI

Mei 1998

Pengerusi : Profesor Madya Dr. K. Kuperan Viswanathan
Fakulti : Ekonomi dan Pengurusan

Kajian ini mengkaji perlakuan tidak patuh nelayan terhadap peraturan pengezonan dalam keadaan penguatkuasaan terhad dalam perikanan Indonesia, Malaysia dan Filipina. Teori utiliti rasional digunakan sebagai rangka untuk menerangkan tingkah laku nelayan terhadap peraturan pengezonan. Satu sampel rawak 'stratified' sebanyak 568 nelayan dari Pekalongan dan Juwana di Indonesia, Kuala Kedah di Malaysia dan Conception, Ilo-ilo City, Roxas City dan Tigbauan di Filipina digunakan dalam analisis ini. Usaha penangkapan dan pendaratan ikan bagi alat-alat penangkapan berbeza diseragamkan dengan menggunakan kaedah indeks geometri.

Model-model ekonomi perlakuan tidak patuh terhadap peraturan di anggarkan dengan menggunakan teknik Logit, Probit dan Tobit. Keputusan menunjukkan bahawa faktor-faktor ekonomi, moral dan pengaruh sosial menentukan keputusan untuk melanggar peraturan. Beberapa angkubah kesahan tidak mempunyai kesan terhadap keputusan untuk melanggar peraturan dalam kajian ini. Angkubah kesahan tidak penting angkubah perkembangan moral dalam



menerangkan tingkah laku pematuhan kepada peraturan. Keputusan ini adalah selaras dengan penemuan Paternoster et. al. (1984) bahawa moraliti mempunyai kesan yang lebih kuat terhadap tingkahlaku melanggar peraturan dan pematuhan kepada peraturan daripada kesahan. Walau bagaimana pun ujian reliabiliti bagi 12 angkuabah kesahan adalah baik dengan nilai Cronbach alpha 73.7%. Secara umum penemuan-penemuan kajian ini adalah selaras dengan model teori tingkah laku pematuhan kepada peraturan yang digubah dalam Bab IV dan ulasan penulisan dalam Bab III.

Dalam amalan penguatkuasaan, kemungkinan dikesan adalah rendah dan kadar melanggar peraturan adalah tinggi di Indonesia dan Filipina disebabkan oleh kekurangan sumber penguatkuasaan dan kawasan pengawalan yang luas. Mengikut teori, tahap pematuhan terhadap peraturan dapat ditingkatkan dengan meningkatkan kemungkinan pelanggar undang-undang dikesan dan ditangkap atau meningkatkan denda. Ini dapat dilakukan dengan meningkatkan proses penguatkuasaan atau intensiti penguatkuasaan. Walau bagaimanapun langkah ini tidak begitu praktikal kerana keperluan sumber kewangan yang banyak. Untuk meningkatkan pematuhan nelayan kepada peraturan di kawasan kajian adalah perlu digunakan penentu-penentu lain seperti moraliti dan pengaruh sosial.

Di Indonesia dan Filipina, institusi-institusi penguatkuasaan tidak begitu mantap seperti di Malaysia. Oleh itu keutamaan harus diberi untuk memantapkan lagi institusi-institusi tersebut. Di Malaysia, institusi penguatkuasaan yang mantap wujud dan yang perlu ialah untuk meningkatkan lagi proses penguatkuasaan supaya ia lebih berkesan. Untuk meningkatkan pematuhan kepada peraturan, pihak pengurusan sektor perikanan harus juga meninjau pendekatan alternatif untuk mengurus sumber tersebut. Salah satu pendekatan alternatif adalah pengurusan bersama.

CHAPTER I

INTRODUCTION

Background

Fisheries are managed in Indonesia, Malaysia and the Philippines through a programme of limited entry. Several common features of their fisheries are the heterogeneous fish producers, variabilities in gears, common fish species and similar capture systems. The property rights over fisheries resources in these countries are with their respective governments. The Government regulates the fisheries sector through licensing, area and gear restriction schemes. One such area restriction scheme is the zoning regulation. The fisheries regulation of interest in this study is the zoning regulation found in the three countries. This regulation prohibits large-scale fishers from operating in the inshore areas.

In Indonesia there are four main zones. The zoning regulation prohibit fishing within three miles from the shoreline for the traditional fishing gears. The detailed specification of the zoning regulation in Indonesia is summarised in Table 1.1.

In Malaysia, the fishing areas are divided into four zones. Zone A, which covers all areas within five miles from the shoreline is reserved for traditional fishing gear owned or operated by traditional fisher. Zone B, covers waters beyond five miles to 12 miles from the shoreline and is reserved for trawlers and purse seines

operating boats of less than 40 gross tonnage (GT). Zone C, covers waters beyond 12 miles to 30 miles from the shoreline and is reserved for trawlers and purse seines operating boats greater than 40 GT owned and operated by Malaysian fishers. Zone D, covers waters beyond 30 miles and is reserved for fishing vessels greater than 70 GT either totally or partially Malaysian owned fishing vessels (Kuperan, 1993). This zoning regulation therefore prohibits trawling within the five mile limit and allocates fishing grounds by types of gear, that is, traditional versus commercial fishing gear, size of vessel, and, ownership status of vessel.

In the Philippines, the fishing area since 1991 is divided into two water zones, namely: (1) Zone 1 which is referred to as municipal waters (15 km at most from the shoreline of the municipality). However, the zoning distance is shortened when fishing is carried out between two islands. Only municipal fishing vessels (3 GT or less, powered or non-powered boats or fishing without a boat) are allowed to operate in zone 1; and (2) Zone 2 referred to as national waters (>15 km) is for commercial fishing vessels(>3GT).

The alleged rationale for the zoning regulation is an attempt at a fair allocation of fishing grounds and resources between the highly efficient trawlers and the less efficient traditional gears. This is expected to reduce competition and conflict between the operators of the two different gears (Jahara, 1988). The regulation is also aimed at reducing over-fishing in the inshore waters.

Table 1.1
Description of Zoning Regulation in Indonesia

Zone	Distance from Shore	Prohibition for
1	0-3 nautical miles	<ol style="list-style-type: none"> 1. Boats with inboard engines displacing over 5 GT 2. Boats with inboard engines over 10 horse power (HP) 3. All types of trawler gear 4. All purse seines 5. Encircling gillnets and drifting gillnets for tuna 6. Seines nets longer than 120 m
2	3-7 nautical miles	<ol style="list-style-type: none"> 1. Boats with inboard engines displacing over 25 GT 2. Boats with inboard engines over 50 HP 3. Otter trawls with head ropes longer than 12 m 4. Midwater trawls and pair trawls 5. Purse seines longer than 300 m
3	7-12 nautical miles	<ol style="list-style-type: none"> 1. Boats with inboard engines displacing over 100 GT 2. Boats with inboard engines over 200 HP 3. Demersal and midwater trawls using otter boards equipped with headropes over 20 m in length 4. Pair trawls 5. Purse seines longer than 600 m
4	Over 12 nautical miles	<ol style="list-style-type: none"> 1. Pair trawl*, except in the Indian Ocean where they are permitted

Note: * for joint-venture investment

Source: Endorsed copy of the Minister of Agriculture Decree No.607, 1976 and Bailey et. al., 1987.

Although the regulations have been imposed to manage fisheries, in practice the non compliance and incidence of encroachment by the large-scale gears and even by foreign vessels into the prohibited fishing area is common. The outcome of non compliance with the zoning regulation is over-fishing and conflict in resource utilisation. Non compliance with the zoning regulation is a serious problem and undermines the effectiveness of fisheries management. From a management perspective it is worth while to investigate the causes of non compliance and explore policies for encouraging or securing compliance.

Statement of the Research Problem

All fisheries are regulated in one form or the other by government. In most cases, in the fisheries of Southeast Asia there is significant non compliance with regulations. Empirical evidence shows that the highest violations in Malaysia were committed by trawler vessels. The number of domestic vessels arrested due to violations of regulations was about 867 per year between 1989 to 1995 (Department of Fisheries, 1996). This figure is higher than the average number of vessels arrested for violation during 1985 and 1987 which was 600 per year (Sutinen et. al., 1988). This might be due to the increase in the number of trawlers operating in Malaysia during the last five years.

Although trawls were banned in Indonesia in 1980 (Presidential Decree No. 39/ 1980), lately there are trawlers operated by domestic and non domestic fishers

using small to large gears (Gatra, 1996 and Forum, 1996). At the same time, some types of longliner and purse seiner gears are fishing illegally within the small-scale grounds as reported by the Fisheries Department officers, fisher's associations, cooperative units as well as by individual fishers.

Empirical evidence of high violation of zoning regulation in the Philippines is also claimed by several researchers from the Philippines¹ (1996). This non-compliance behaviour could be attributed to tight competition among the resource users in harvesting the depleted fisheries and non economic factors such as institutional ineffectiveness, individual morality and social pressure. The tough competition among the resource users occurs in the inshore areas where all fishing vessels are capable of fishing in those grounds. Vessels with large-scale capacity could produce lucrative "illegal" landings if they encroach into the small-scale zone. The structure of the enforcement and penalty system in Indonesia and the Philippines results in low detection rates and also low expected sanctions. This has resulted in high incidence of non compliance with regulations. In addition, fishers may be driven to violate in the context of the situation they are in. For example a fisher who is returning from a bad day at sea (poor catch) may be driven to violate although under normal situation he or she would be a complier. Therefore, securing compliance with regulations is a much more difficult task.

Compliance is however necessary for successful management of the fisheries by the authorities regulating fisheries. The challenge is how to secure compliance as

¹ Internal seminar with researchers from UPM; UPV; UNIP and AFSSRN-ICLARM, Malaysia 2-5 Jan.'96.



efficiently as possible. Enforcement is often linked with securing compliance. The traditional link is that a high level of enforcement or deterrence will result in a high level of compliance. However enforcement is costly and regulatory authorities faced with declining budgets have to explore alternative ways of securing compliance. Governments face the challenge of securing compliance with limited enforcement resources. Thus, enforcement is usually far from complete and may seriously jeopardise the effectiveness of fisheries management.

A whole body of theory however suggests that there are aspects of compliance other than deterrence that are important in securing compliance. Therefore the key questions to be addressed in this study are: What are the factors affecting the non compliance behaviour of the fishers? How frequent are the incidences of violation by the fishers in the study areas? How can the violation behaviour of the fishers be effectively modelled? What strategies can the regulatory authority adopt to improve compliance levels in the fishery? Are there possibilities for improving compliance levels of the fishers using traditional enforcement? Are there possibilities for securing compliance without heavy reliance on costly enforcement? These are some of the questions for which regulatory authorities seek answers.

Unfortunately, very little research has been conducted in this field. Empirical studies of the economic aspects of regulatory enforcement in fisheries are limited and mostly undertaken in the USA and Canada such as by Blewett et. al. (1987).

¹ Internal seminar with researchers from UPM; UPV; UNDIP and AFSSRN-ICLARM, Malaysia 2-5 Jan.'96.

They employed models developed by Becker (1968) to estimate occurrence of non compliance in the lobster and groundfish fishery in Quebec. Lepiz and Sutinen (1985) examined surveillance and enforcement of the Pacific tuna fishery in Costa Rica using a zero-one integer programming model. Sutinen and Gauvin (1989) investigated non compliance levels of commercial lobster fishers in Massachusetts using mail survey data and estimated non compliance by using single stage regressions. Bean (1990) applied two stage least squares estimation for the Quahog fishery in Narraganset Bay. Sutinen, Raiser and Gauvin (1990) borrowed the theoretical work of Young (1979) to explore non compliance behaviour of the groundfish fishery in Northeast of USA. Furlong (1991) tested the deterrence effect of enforcement in the Quebec fishery of Canada. The only study of fisheries regulatory compliance in Asia is by Kuperan (1993) undertaken in Malaysia. Therefore, it is timely to obtain a deeper understanding of the enforcement and compliance issues in the fisheries of the three countries, Indonesia, Malaysia and the Philippines.

The focus of the study is to develop and test a model of regulatory compliance in the fisheries of Indonesia, Malaysia and the Philippines. It is hoped that the findings in this study will shed some light on how to formulate strategies for achieving better compliance in the fisheries of the three countries.

Objectives of the Study

The overall objective of the study is to examine non compliance behaviour of the fishers towards fisheries zoning regulations in Indonesia, Malaysia and the Philippines. The specific objectives of the study are:

- (1) To describe and explain the fisheries profiles and enforcement institutions and surveillance activities in Indonesia, Malaysia and the Philippines;
- (2) To develop a model of non compliance behaviour for the fishers in Indonesia, Malaysia and the Philippines;
- (3) To examine factors affecting non compliance behaviour of the fishers,
- (4) To provide policy recommendations for improving compliance level in the fisheries of the respective countries.

Significance of the Study

This study aims to explain the compliance behaviour of fishers with regard to the fisheries zoning regulations in Indonesia, Malaysia and the Philippines. Understanding compliance behaviour will be an important step for formulating improved fishery regulatory programmes. The success of any fisheries management programme will depend on the extent to which fisher adhere to the regulations. There is limited research on enforcement and/ or compliance with fisheries