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THE CONSEQUENCES OF ILLEGAL, UNREPORTED AND UNREGULATED FISHING FOR FISHERY DATA AND MANAGEMENT

EXPERT CONSULTATION ON ILLEGAL, UNREPORTED AND UNREGULATED FISHING ORGANIZED BY THE GOVERNMENT OF AUSTRALIA IN COOPERATION WITH FAO

THE CONSEQUENCES OF ILLEGAL, UNREPORTED AND UNREGULATED FISHING FOR FISHERY DATA AND MANAGEMENT

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PREPARATION OF THIS REPORT

This paper has been prepared as one in a series of specialist background papers for the Expert Consultation on Illegal, Unreported and Unregulated Fishing Organized by the Government of Australia in Cooperation with FAO, Sydney, Australia, 15-19 May 2000. It is expected that this series of papers and the expert consultation will contribute to the elaboration of an international plan of action (IPOA) to deal effectively with all forms of illegal, unreported and unregulated (IUU) fishing, the development of which is being undertaken in accordance with a decision of the 1999 FAO Ministerial Meeting on the Implementation of the Code of Conduct for Responsible Fisheries. The views expressed in this paper are those of the author and do not necessarily reflect the views of FAO or of any of its Members.

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ABSTRACT

Incomplete knowledge in managed fisheries compromises fisheries management approaches. The absence of information in unmanaged fisheries limits the ability to establish management at some future date. This paper outlines the complex problem of the lack of fishery information that results from IUU fishing, including its setting and scale. Issues that relate to information coverage, precision and accuracy are discussed, together with measures that can be adopted to improve these. Improving fishery information through system developments, including improvements to Observer Programmes, Monitoring Control and Surveillance and the new methods of Vessel Monitoring Systems, are summarized. Alternative methods to assess fishery information are briefly discussed. The paper also notes the human and financial resource problems that limit more effective collection of fishery information, particularly those that face developing countries. The paper concludes that there are few technical impediments to obtaining the necessary data, but that policy, legal and institutional arrangements, particularly at the international level, need to be more firmly established and actively implemented, in particular flag State duties and responsibilities.

CONTENTS

EXECUTIVE SUMMARY

1. The application of fisheries management for the effective conservation and sustainable development of living aquatic resources requires large quantities of information of many kinds, from catch and fishing operations, and from biological, ecological, oceanographic, economic and socio-cultural sources. IUU fishing limits the availability of information, and distorts and devalues information from compliant (non-IUU) fishing.

2. Consistent with the precautionay approach, the recognition that information is uncertain, unreliable or inadequate forces fishery managers and scientists to be more cautious than would otherwise be the case. Thus IUU fishing not only deprives legitimate fishers of fish harvest potential, but also results in lowered confidence in stock assessments. The consequent application of lowered limits to allowable catches, in order to minimise stock overexploitation risks, further reduces stock availability to legitimate participants.

3. There is growing evidence of widespread evasion of information obligations by fishery participants. At national scales there is often complacency about the intractability of the problem, as evidenced by the 'standard' methods in some countries to estimate information slippage (statistical analysis, observer reports and best guesses). At the international scale, particularly where there are bilateral or regional access agreements, the degree of under-reporting against reporting obligations is difficult to assess, but can be up to 75%. On the high seas, as fishing technology has increased accessibility to deeper or more marginal stocks not subject to effective control, the degree of non-reporting with respect to these stocks may well be 100%.

4. There is a range of solutions to the problem of obtaining more reliable fisheries information, including the use of logbooks, observer and inspection programmes and monitoring, and control and surveillance systems, all of which have recently been supplemented by the availability of vessel monitoring systems. However, these mechanisms vary enormously from country to country and region to region, and there is a need to establish compatible regional and international standards for them as well as standards/protocols for data exchange. Implementing such systems for developing countries can be difficult due to resistance and non-compliance from foreign fleets, and lack of resources and workable examples and standards.

5. The international community has adopted the Code of Conduct for Responsible Fisheries (FAO, 1995), and has formulated the UN Fish Stocks Agreement (1995, not yet force) and the FAO Compliance Agreement (1993, not yet in force). These fisheries instruments, the first two of which incorporate the precautionary approach explicitly, are taking time to be put into practical effect. They contain important obligations and duties, including requirements to develop and maintain systems for the generation and exchange of fishery information. Effective implementation of the fishery data requirements in these instruments by all States and fishing entities would largely resolve *inter alia* the problems of data distortion due to IUU fishing that currently contribute to inadequate fisheries management and fish stock assessments.

6. In principle, technical data matters can be resolved; information procedures and standards can be developed; systems can be implemented (including through assistance to developing countries, as necessary); information cooperation can be facilitated, especially through regional fisheries management organisations or arrangements; and the burden of IUU fishing on global fisheries' sustainability can be ameliorated through adequate control mechanisms. However, none of these things is possible or likely until all States, including flag States in particular, accept and implement the duties and responsibilities in the Code of Conduct, the UN Fish Stocks Agreement and the FAO Compliance Agreement.

SUGGESTIONS FOR THE IPOA TEXT

7. Recognising that IUU fishing leads to increased uncertainty in making responsible fisheries management decisions and in assessing the status of fish stocks, and noting that the precautionary approach requires these uncertainties to be taken into account if fisheries are to be managed responsibly, the following suggestions for the IPOA text are recommended.

Flag State and Port State Duties and Responsibilities Concerning Fishery Data

8. All States and fishing entities to declare their

- commitment to maintain accurate fishery data in connection with the fishing operations of all fishingvessels flying their flag, operating in all fisheries;
- commitment to maintain provenance information for all fish landings; and
- support for developing countries to enable them to develop and implement legislation, institutions, capacity and systems for fisheries data and information.

Fishery Information Standards and Procedures

9. All States and fishing entities to cooperate through FAO and regional fisheries organizations and arrangements in establishing and implementing international standards and practices for the collection and maintenance of fishery data, and the development of agreed formats and procedures, including:

- fisheries statistical standards and classifications.
- data content and precision, and methods for agreeing and prioritising them.
- procedures for information security and access, including practical definitions of “applicable confidentiality” to ensure effective fisheries management.

Data Exchange

10. Flag States to register and exchange fishing vessel information, on the basis of agreed international data exchange formats and communications protocols.

Fishery Inspection

11. All States and fishing entities to generate improved flag State and port State landings information through the compulsory inspection of all fish landings by all flags at their ports to establish provenance and custody.

Fishery Observers:

12. All States and fishing entities to develop agreed frameworks for the conduct of observer programmes, including in national, regional and high seas fisheries.

Cooperation in MCS:

13. All States and fishing entities to cooperate in the conduct of MCS operations and the exchange of information to improve their effectiveness, including through the mandatory installation of VMS systems in ways that reflect the management needs and objectives for a region or fishery and through the further elaboration of VMS data standards and information exchange protocols.

Analysis:

14. All States and fishing entities to cooperate, including through FAO and regional fisheries organizations and arrangements in developing analytical and statistical methods for determining the nature and extent of under-reporting and mis-reporting of fishery data and in reviewing methods for monitoring the nature and extent of IUU fishing.

1. INTRODUCTION

1.1 The Consequences of IUU Fishing for Fishery Information and Management

15. The failure to accumulate fisheries data and understand the full nature and extent of fishing undermines the ability to manage fisheries. This information failure leads to the inaccessibility of information on fish removals from stocks, hence compromising the ability to predict future stock size and capacity to provide yields.

16. This paper focuses on the issue of information for two purposes - fishery control and fishery assessment - but it is clear that IUU fishing poses threats beyond these. Large scale and unregulated fish removals have the potential to disrupt ecosystem stability and productivity. Illegal fishing with inappropriate fishing methods can degrade the environment. And any non-reporting or mis-reporting of information that is required for the purposes of obtaining best scientific evidence limits the ability to develop such evidence. Given the general agreement that the precautionary approach should be widely applied, the consequences of IUU fishing will inevitably mean that a greater degree of precaution is required. IUU fishing undermines the ability to adopt a precautionary approach that enables fishing to be conducted, and its benefits to be accrued, at or close to maximum sustainable yields or the objective of optimum utilization.

17. The application of the precautionary approach receives wide and detailed reference in the Code of Conduct for Responsible Fisheries and the UN Fish Stocks Agreement, and it is implicit in the FAO Compliance Agreement since this agreement forms an integral part of the Code. Article 6.2 of the Fish Stocks Agreement is explicit on information:

> *"States shall be more cautious when information is uncertain, unreliable or inadequate. The absence of adequate scientific information shall not be used as a reason for postponing or failing to take conservation and management measures."*

18. IUU fishing results in information that is 'uncertain, unreliable or inadequate'. It forces greater precaution and hence limits the objective of optimum utilization.

19. The application of the precautionary approach to new or exploratory fisheries requires:[1]

> *"… cautious conservation and management measures, including, inter alia, catch and effort limits. Such measures shall remain in force until there are sufficient data to allow assessment of the impact of the fisheries on the long-term sustainability of the stocks, whereupon conservation and management measures based on that assessment shall be implemented. The latter measures shall, if appropriate, allow for the gradual development of such fisheries."*

20. Recent discoveries and exploitation of new high seas fisheries (e.g. Patagonian toothfish and orange roughy) have clearly ignored these obligations.

21. Even within managed fisheries that try to comply with their data requirements, there are general information failures that relate to issues of information coverage, content, precision and accuracy. Indeed, fishery managers often recognise these deficiencies; fishery research continuously tries to estimate and account for them in stock assessments; and statistical programmes and methods try to make up for the deficits.

1.2 Analysis of IUU Fishing and Fishery Information

1.2.1 Characterisation of the Problem

22. IUU fishing contributes to, and further exacerbates, these general information failures. Characterisation of the origins and nature of these failures to deliver appropriate information is not a simple task: it is multi-dimensional. The first dimension is the level and degree of management. Between the state of an entirely unmanaged/unregulated fishery and the state of a fully managed fishery (in which illegal fishing takes place), there is a general continuum. Management measures are not always, nor may be required to be, designed to manage all aspects of fisheries. Some fisheries may be subject to input controls, such as limits to effort (including gear), seasons and

[1] The same wording is used in the Code of Conduct for Responsible Fisheries Article 7.5.4 and UN Fish Stocks Agreement Article 6.6

areas; others may be subject to output controls, such as total allowable catch, quotas, by-catch or target species controls (fish size, gender/maturity). In practice, there will often be a mix of some or all of these. Thus, in terms of the level and degree of management, the continuum between managed and unmanaged fisheries is a complex mix of controls that is dependent on the fishery concerned. General unreported fishing falls somewhat uncomfortably within this continuum, since it applies (at the legal level) where any failure to report is an offence, but it is also a feature of unregulated fisheries, where there is no (current) legal reporting requirement, even though it may be desirable to regulate the fishery concerned.

23. The second dimension is the setting, i.e. fishing within the legal, policy, institutional, compliance control and management resources frameworks. The third dimension is the scale, i.e. fishing at the individual, community, national or international levels.

24. Tables 1 (a) and 1 (b) below offer a general analysis of IUU fishing against the setting and scale in which they take place, with particular emphasis on information, and the failures/means to obtain it.

1.2.2 Objectives of the Two Information Components

25. The two key components of fishery information are information that enables fishery management within the applied control rules (Management Control), and information that provides (some) sources for the determination of control rules (Management Measures). Both of these comprise numerous elements, many of which are common.

26. At the most basic level, the provision of fish catch information (landings and discards) enables managers to ensure fishing is within the TAC, and scientists to estimate future stock abundance. Similarly, a detailed knowledge of catch composition enables managers to assess compliance with target and by-catch limits, and scientists to assess changes in stock structure and interactions. The level of detail required of fishery information depends on the specific management objective and on the particular fishery.

27. In most cases, fishery information is required for the determination of management measures that meet both biological and economic considerations, and there is increasing influence from concerns that management measures should also take account of social dimensions. At the large scale, these social dimensions include the rights and responsibilities of nations within their fishery zones. And increasingly, the proximity to, and dependency of, coastal states on fisheries beyond their jurisdiction are factors that should be included in determining management objectives. Further, the particular circumstances of developing countries and small island states play recognised and important parts in setting management objectives and decision-making. At the community scale, social factors, including economic, cultural and nutritional dependency, play major roles in setting and monitoring fishery management objectives. Whatever the scale of concern, the overriding objective should be sustainability[2].

2. INTERNATIONAL ARRANGEMENTS AND IUU FISHING

28. Given that individual fishers will tend to operate in their own self interest unless controlled within legal and institutional frameworks, it is not surprising that IUU fishing at all scales - national to international - and driven by technology advances and global opportunities is undermining present and future fisheries sustainability. The past decade has witnessed the first serious international attempts to put in place practical mechanisms that address the two key deficiencies and sources of the problems in fisheries information; inadequate flag state responsibility and lack of legal and institutional arrangements.

2.1 Flag State Responsibility

29. The general acceptance by nations of the Code of Conduct for Responsible Fisheries implies that they will take responsibility for the fishing activities of their flag vessels, including the provision of data. In the General Principles of the Code, Article 6.11 is clear:

"States authorizing fishing and fishing support vessels to fly their flags should exercise effective control

[2] For a comprehensive treatment of fishery information see "Guidelines for the Routine Collection of Capture Fishery Data" FAO Fisheries Technical Paper, 382. Rome, FAO. 1999.

> *over those vessels so as to ensure the proper application of this Code. They should ensure that the activities of such vessels do not undermine the effectiveness of conservation and management measures taken in accordance with international law and adopted at the national, subregional, regional or global levels.* ***States should also ensure that vessels flying their flags fulfil their obligations concerning the collection and provision of data relating to their fishing activities.****"*

30. Although these are not binding obligations, since the Code is voluntary, the scope of this article establishes that States should control the activities of their vessels, ensure compliance with management measures (at all scales) and collect and provide data according to the vessel's obligations. This latter concern is reiterated throughout the Code, in particular Article 7.4 *Data gathering and management advice*. Indeed, throughout the relevant sections of UNCLOS, the UN Fish Stocks Agreement and the FAO Compliance Agreement (not yet in force) there are continuous references to the obligations of flag states to collect and provide accurate data.

31. This information requirement receives special emphasis in the UN Fish Stocks Agreement through its detailed *Annex 1. "Standard Requirements for the Collection and Sharing of Data".* In the FAO Compliance Agreement particular reference is made to the maintenance and exchange of records of those fishing vessels that are authorised to fish on the high seas. For a more comprehensive treatment of the legal aspects of fisheries data collection, see Edeson's papers.[3]

32. In fishing agreements between countries, whether between neighbouring states or involving distant water fishery access agreements, there are usually specific requirements for information delivery to the jurisdiction where the fishing took place. At the scale of regional organisations, which cover national, regional and international fishing zones, the same is usually required, although there are often gross differences of detail. Although beyond the scope of this paper, it would be informative to examine these differences in detail, to ascertain the strengths and weaknesses of the various approaches to fishery data management.

33. Information requirements for well-established regional organisations (such as ICCAT, CCAMLR, NAFO, etc) have been developed over many years., In the South Pacific tuna fisheries, which have established Harmonised Minimum Terms and Conditions of Access (for foreign flag vessels) for the member countries of the Forum Fisheries Agency (FFA), regional registers of fishing vessels, fishery logsheets, current vessel operating reports (and, latterly, vessel monitoring system reports), observer reports and other sources of data have become integral parts of their individual Fishery Access/Licence Agreements with distant water fishing nations (and fishing entities). These conditions are also included in the FFA collective regional fishery treaty with the United States.

34. Whatever the origins and details of fishery information requirements, it is recognised that many flag states do not live up to their full obligations, except to a greater or lesser extent within their own fishery jurisdictions. Even in that case, the degree of non-reporting, mis-reporting, and avoidance (or distortion) of information can often be a serious handicap to the proper preparation of statistics for compliance control and scientific purposes. Some alternative methods or approaches that may be used to fill these gaps where other efforts fail are addressed below. However, these alternatives are at best a poor substitute for the provision of timely, accurate and comprehensive data by flag States in accordance with their obligations and commitments under global, regional or national agreements or codes.

35. Overlying the general problem of insufficient data collection by flag states is the issue of information accessibility. This has two dimensions: applicable confidentiality, and transparency. Article 7.4.4 of the Code concludes with the following sentence: *"States should compile and disseminate such data in a manner consistent with any applicable confidentiality requirements"*. This term, which can be invoked to limit the provision of data, remains undefined[4]. Clearly there are cases where data is commercially sensitive, but the intention of the Code is that there should be an appropriate balance which protects legitimate commercial concerns while also ensuring important fishery management needs can be satisfied. Thus the Compliance Agreement and the UN Fish Stocks Agreement each make it clear that confidentiality requirements should not apply in such a way as to *"undermine the effectiveness of international conservation and management measures".*[5]

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[3] Edeson, W.R. Legal Aspects of the Collection of Fisheries Data. *FAO Fisheries Circular.* No. 953 FIDI/C953. Rome, FAO. December 1999, and Edeson, W.R. Tools to address IUU Fishing: the current legal situation. AUS:IUU/2000/8. This expert consultation; Background Paper 5, 2000.

[4] Indeed, it is likely to be fishery or regionally specific.

[5] Article III Flag State Responsibility. FAO Compliance Agreement, and Article 18 Duties of Flag State, UN Fish Stocks Agreement.

The provision of information to control fish catch or fishing effort within allowable limits, and of information to enable the determination of these limits, are often part of fisheries agreements. Avoidance of reporting, to prevent legal sanction or censure or financial penalty that could otherwise apply, cannot be considered as an acceptable resort to applicable confidentiality.

36. Fisheries literature includes some estimates of the degree of non-reporting by flag states,[6] but such estimates are very difficult to verify. The particularly difficult position of developing countries and small-island states in reporting comprehensively not only puts at risk the effective implementation of national (and regional) conservation and management measures but also their ability to benefit from their fishery resources. It reduces stock available to them, undervalues the fishing revenues due to them and limits their abilities to develop their own fishing industries.

37. The second dimension of information accessibility is transparency and cooperation. In the UN Fish Stocks Agreement, Article 12 provides explicitly for transparency in decision-making processes, records and reports (subject to procedural rules). Article 14 provides detail of obligations for the provision, publication and dissemination of research and information[7].

38. The failure of many flag States to meet their information responsibilities, stems from a wide range of circumstances. At one end of the scale are institutional inadequacies - the lack of appropriate resources *to "ensure that fishing vessels flying their flag provide such information…".* At the other end of the scale, there is evidence of deliberate distortion of information. Enhancing flag state responsibility for the provision of accurate data should be part of the IPOA. The overall issue of flag State responsibility is dealt with more extensively in other papers in the AUS:IUU/2000/ series.

2.2 Legal and Institutional Arrangements

39. The problem of flag States failing to provide information that would assist in combating IUU fishing is further compounded by a lack of legal and institutional arrangements covering all the ocean regions or fisheries where IUU fishing is a concern. The UN Fish Stocks Agreement and the FAO Compliance Agreement are still not in force; and some countries have still not signed UNCLOS. National fisheries legislation in many countries remains inadequate for modern fisheries management. To date, only two ocean regions (the South East Atlantic and the Central and Western Pacific) have begun negotiating the formation of organisations or arrangements to implement the UN Fish Stocks Agreement. While most of the world's oceans are subject to voluntary cooperative agreements (in particular on information exchange) between interested States, many have not yet reconsidered their mandates and operations to include the binding obligations stemming from these new agreements once they enter into force.

40. In terms of information content, the calls to provide data are well covered by various articles of the Code of Conduct and the two Agreements. They include reference to the basic fishery data required: vessel registers (including licence details); catch, discards and effort data; fishing location and fishing operations data; catch composition and biological information; and survey data on stock abundance, oceanography and ecology. They also provide guidance for the recording and reporting of data through the establishment of national, regional and global standards; methods for data verification (observer and inspection schemes, landings and transhipment monitoring and market information); and monitoring, control and surveillance (including regional cooperation and the use of vessel monitoring systems).

41. The capacity to allocate resources to collect all this data, prepare it and disseminate it appropriately, varies tremendously between countries. The calls (in the Code) for the establishment and institutionalisation of international standards and practices in the collection and maintenance of fishery data, the development of agreed formats and transparent procedures (including the responsible interpretation of applicable confidentiality) are amenable to prescription and should be part of the approach to the establishment of an IPOA.

[6] See for example, Worldwide Fund for Nature, The Footprint of Distant Water Fleets on World Fisheries, WWF-Endangered Seas Campaign, 1999.
[7] This Article also points to Annex 1 where it states that "Confidentiality of non-aggregated data shall be maintained".

3. REQUIRED INFORMATION

3.1 Coverage

42. The increasing incidence of IUU fishing has led to the need for an increase in the transparency, precision and detail with which key fishery data and information are provided. For example, current information requirements may not provide sufficient clarity as to whether some or all of a catch has or has not been taken in a specific area subject to fishery conservation obligations, and this may enable an IUU fisher to deny the catch was taken illegally.

3.2 Content

43. Setting standards for data content and precision, or establishing ways to agree to them, will be important contributions to the section of the IPOA on fisheries data and information.

3.3 Accuracy

44. Ensuring that data are updated and verified, that databases are maintained and that data are disseminated accurately, according to agreed practices, and consistent with the agreed purposes for which it was collected, will support the confidence of States and fishers that data are being properly used and hence worthwhile to collect.

45. The problem of non-reporting and mis-reporting affects the ways stock assessments are undertaken. The working groups used in many regions worldwide continue to estimate unreported fish catches for their stock assessments. However, estimates should be replaced wherever possible by data obtained from improved systems of data collection which have particular regard *inter alia* for the issues needing to be addressed in combating IUU Fishing.

4. INFORMATION REPORTING METHODS

46. In terms of the origins of data there are two general approaches; 1) through reporting of data by fishery participants and 2) through the collection and reporting of data by fishery-independent personnel and systems. In general, both approaches should always be used to collect and verify the information required. The IPOA should examine the extent to which existing codes and agreements meet this need and whether new approaches are necessary to combat IUU fishing.

4.1 Data Reporting

47. The primary means of gathering basic fishery information from fishery industry participants is through a range of mandatory submissions to fishery management authorities.

48. In terms of combating IUU fishing, the most important mechanism to increase the level and accuracy of basic fishery data is through the requirement to maintain transparent, accessible records of fishing vessel registrations and their authorisations to fish, including information on the nature and capacity of fishing vessels, their ownership, flag and fishery authorisations. This provides the key information around which other relevant information can be accumulated. This requirement is explicit in the FAO Compliance Agreement, which details the scope of the information required. The IUU/IPOA should call for flag States to register and exchange such vessel information, including the establishment of international data exchange formats and communications protocols.

4.2 Data Collection and Verification

49. Data collection refers to any information gathered by fishery-independent means; it is not subject to intervention by fishery participants. IUU fishing requires such independent data collection primarily because the fishers are essentially non-compliant with information obligations. The data types required are most often the same as would be required under data reporting schemes, but with the additional attribute that they can be used to verify data reporting. The use of fishery observers, even though this is difficult and expensive, is often the only way of either replacing data reporting or verifying such reports.

50. Data collection by inspectors at landing sites, whether census or sampling, through inspection

of off-loadings and factory/cold storage throughput, are primarily used for catch data verification. Allowing the fish production from IUU fishing to pass unrecorded through ports clearly undermines fisheries management. Catch offloading by vessels at ports is the critical information control point that needs improving.

51. The IUU/IPOA should call for improved flag state and port state involvement in the generation of landings information, including its provenance.

5. INFORMATION SYSTEM METHODS

5.1 Observers

52. Observer programmes cannot be used in all circumstances of IUU fishing since they rely on the compliance (and goodwill) of participants. While it should never be explicit in the design and implementation of observer programmes, there is plenty of evidence to suggest that properly administered observer programmes not only collect the necessary data but also deter or reduce non-compliance with management measures.

53. The use of observers, including with 100% coverage, to combat IUU fishing is growing. The IUU/IPOA should include a call for development of agreed frameworks for the conduct of observer programmes in all relevant fisheries.

5.2 Monitoring, control and surveillance

54. Monitoring, control and surveillance (MCS) programmes are an important means of securing real-time information on IUU fishing. However, they are complex and costly, and their effectiveness is proportional to the likelihood of encounters between the MCS platform (patrol aircraft or vessel) and the fishing vessel. The likelihood of encounters and the deterrent effect is generally dependent on the capacity and resources of the MCS programme to cover the range of the fishery, the intelligence that the MCS programme can develop to target the fishery and the perception of fishery participants of the risk of detection and expected penalties in conducting IUU fishing.

55. The IUU/IPOA should call for increased cooperation between flag States in the conduct of MCS operations and the exchange of information to improve their effectiveness.

5.3 Vessel Monitoring Systems

56. The growing availability and introduction of vessel monitoring systems (VMS) using satellite-based communications linked to global positioning systems offers an unprecedented capability to gather independent information on the conduct and results of fishing operations. VMS is seen as a general tool for greatly increasing the monitoring capacity of fishery authorities, which envisage economy and efficiency benefits to their MCS programmes. Linked to other measures, such as the development and use of electronic log books, the mandatory application of VMS has significant potential to combat IUU fishing.

57. The issue of internationally or regionally recognised standards for the formatting of VMS data messages remains a problem, but is likely to be resolved in the near future. Some of the issues have reached general consensus, including the use of the International Standards Organisation's formats for character sets, country codes, date and time, and INMARSAT standards for reporting position.

58. Although these standards are primarily useful in establishing global standards for some aspects of fishing vessel reporting, it will become necessary to address standards for other components of required fishery data messages, which will almost certainly be fishery or region dependent. These components may include vessel identifiers, speed and course, environmental data and catch and operations reporting. Indeed, it is likely that some of these data types may be considered mandatory within some management regimes while non-mandatory in others. Just as the scope of information required for fishery logbooks varies, so too will the scope of VMS data messages.[8]

[8] For a general treatment of VMS message formats, see Fishing Operations. 1. Vessel Monitoring Systems. FAO Guidelines

59. Adding data to position reports (Extended Format Position Reports) increases their complexity but also their fisheries management value. Catch by species, by vessel and gear type, by product type and quality, by preservation and storage method, could be provided. Data standards need to be adopted for these. Species and fishing vessels and gear already have international code standards[9] and it should be a relatively simple matter to agree standards (perhaps copying the 3-digit species mnemonics) for other data types.

60. Submitting data in this way offers greater confidence in the accuracy of submissions because they are not subject to transcription error, can be provided without risk of intervention and can be directly used to update databases. However, unlike the independence of spatial and temporal information (and environmental information from ship sensors) achievable by VMS, such data will always be directly input by people. While mis-reporting at this point is always likely, the immediacy of catch reporting in this way enables faster implementation of management measures (quota or fishery closures) and is no worse than paper logsheet reporting. Indeed, the development of information integration on fishing vessels is advancing so rapidly that the use of electronic logbooks and their transmission through VMS (or other) systems is now feasible. Many fishing companies already employ such systems for fleet and fish processing management. Extending this capability as a requirement for fishing vessels that operate on the high seas, within access agreements or subject to specific terms and conditions will provide an additional means of combating IUU fishing.

61. The IUU/IPOA should include calls for the mandatory installation of VMS systems in ways that reflect the management needs and objectives for a region or fishery. The IPOA should call for the further elaboration of data standards and information exchange protocols.

6. ALTERNATIVE APPROACHES TO DATA COLLECTION

6.1 Data Exploration and Analysis

62. Detecting missing information when other methods to obtain full data coverage have failed, or there are suspicions that reported data are being distorted, is a difficult task, but various statistical methods can be employed. Clearly, the basic fishery information on who is operating in the fishery is essential. Vessel registers and frame surveys provide this, and no amount of analysis is of use without it. With registration and licensing information and some knowledge of catch rates (often accumulated through observer programmes or historical data), it is possible to develop models of catch likelihood that can provide rough estimates of the degree of under-reporting. If there is fleet-wide report distortion, and this continues from year to year using the same factors, it is usually not possible to determine mis-reporting. Where data is supplied by fleets in grossly aggregate form, the opportunities for consistent under-reporting are obvious. However, when individual vessel data is required, the likelihood is small that flag states or fleets can develop fully coordinated approaches to mis-reporting or general information evasion. Therefore, data exploration and analysis, through the investigation of outliers and discriminant analysis, etc, can often give some estimate of missing or distorted data.

63. The IUU/IPOA should include further investigations into the development of analytical and statistical methods for determining the nature and extent of under-reporting and mis-reporting. Reviews of existing data should be undertaken to enable revised estimates of the extent of IUU fishing.

6.2 Market, Trade and Consumption Information

64. Identifying IUU fishing often results from unexplained arrivals of fish on the local or international markets. It is often reasonable to assume that fish landings without a declared provenance, which can be checked against catch records, comes from IUU fishing. Maintaining provenance information (for example through chain of custody records) across all transactions is an extremely difficult task, but this method is receiving greater attention, for example by regional fisheries bodies in the form of catch or import documentation schemes, and forms one of the

for Responsible Fisheries. No. 1, Suppl.1. Rome, FAO. 1998.

[9] FAO 3-digit species code, International Standard Statistical Classification of Fishing Vessels (ISSCFG) and International Standard Statistical Classification of Fishing Vessels (ISSCFV).

methods that is, or can be, employed to combat IUU fishing.[10]

65. The IUU/IPOA should call for flag States and port States to require provenance information for all fish landings, particularly in fisheries where IUU fishing is of concern.

7. CONCLUSIONS – RESOURCES AND RESPONSES

7.1 Limits Imposed by Human and Financial Resources

66. IUU fishing undermines fisheries conservation and management and the fisheries' economy by imposing additional costs on fisheries management by legitimate fishers, while allowing IUU fishers to avoid all or many of the compliance costs they should be contributing to.

67. In all countries, in particular in developing countries and small island states, there are limits to human and financial resources that can be applied to fisheries management, particularly as combating IUU fishing generally provides only limited immediate economic benefits.

68. Enhanced and improved information from a wide variety of sources will help to lessen the fisheries management cost burden. In access fisheries, there needs to be greater commitments by the flag States to enforce their obligations to provide the basic fishery information to coastal states.

7.2 Policy, Legal and Institutional Responses

69. Ignoring or failing to obtain the data needed to combat IUU fishing is perilous for global fisheries' sustainability. However, recent and potential additions to international law and changes in the practice of States offer some scope for addressing this issue.

70. In seeking to take advantage of the specific fishery information and data provisions of instruments such as the UN Fish Stocks Agreement, the Compliance Agreeement or the FAO Code of Conduct, care must be taken to interpret their principles and standards in the light of specific fishery and regional requirements. What is appropriate, for example, for Atlantic or South Pacific tuna fisheries may not be suitable for North Pacific Groundfish. Taking these differences into account is the responsibility of the regional fishery organisations and their member States. Strengthening the mandates, legal position and institutional capacity of the organisations is essential, but so is an enhanced commitment of member States to meet their obligations in full through the adoption of relevant national regulations.

71. The Code of Conduct calls for the generation and exchange of information between fishery participants and fishery authorities, between fishery authorities and their regional fishery bodies, and between regional fishery bodies and the global community, including FAO. This call is reaffirmed and specified in greater detail in the UN Fish Stocks Agreement and the Compliance Agreement.

72. The institutional weakness and financial constraints of some States, in particular developing countries, is widely recognised and assistance should be given to them to enable their effective participation in relevant fisheries organisations, particularly with respect to the provision, verification and assessment of fisheries data in accordance with their international, regional and national needs and responsibilities.

73. Deliberate action by IUU fishers or any State to avoid or falsify the provision of essential fisheries management data and information, or to misuse such data, should be actively and publicly exposed. Practical measures consistent with the FAO Code of Conduct, such as the development and active use of globally accessible databases, data and reporting standards to improve the transparency of fishing operations and the relevance of management decisions based on such data, will go a long way to combating IUU fishing.

[10] See Bray, Kevin. "A Global Review of Illegal, Unreported and Unregulated (IUU) Fishing" (document AUS:IUU/2000/6).

Table 1 (a). Problems in Information in Relation to IUU Fishing – the Setting

State/Setting	Legal	Policy	Institutional	Compliance Control	Management Resources
ILLEGAL Fishery is against the law	Inadequate regulations or penalties for deterring non-compliance with reporting	Lack of interest by policy-makers, or corruption	Non-awareness of the fishery activity by fishery authorities; No institutional responsibilities established	Poor surveillance and enforcement capacity, or Corruption	Inadequate resources (human/vessels/aircraft/ communications/finance), or Alternate information inaccessible
UNREPORTED Fishery can operate without reporting	Legal instruments in place but no requirements for reporting Or Reporting non-compliance goes un-penalised	Poor policy formulation, or No policy requirement	No institutional responsibilities established, or Corruption	Poor surveillance and enforcement capacity, or Corruption, or Inadequate monitoring or Observers/Inspectors resisted/corrupted/disregarded	Inadequate resources (human/vessels/aircraft/ communications/ finance), or Alternate information inaccessible, or Poor monitoring performance
UNREGULATED a) Fishery can operate without control b) Fishery is uncontrollable	Legal instruments are a) not required or b) legal instruments are in place but not applied to one or all fisheries or c) inadequate to meet the situation	Policy is a) not required or b) inadequate to meet the situation Lack of political will or recognition	Institutions are a) not required or b) inadequate to meet the situation Poor information systems	MCS mechanisms are a) not required or b) inadequate to meet the situation Poor information coordination	Resources are a) not required or b) inadequate to meet the situation No databases, communications or people

Table 1 (b). Problems in Information in Relation to IUU Fishing – the Scale

State/Scale	Individual	Community	National	International
ILLEGAL Fishery is against the law	Individual acts separately from other participants, and does not report activity	Community fishes locally, or distantly, disregarding regulations and failing to report	Nation actively or passively fails to control (or encourages) flag vessels to fish unreported	International agencies fail to apply legal instruments OR Failure to penalise/sanction errant members
UNREPORTED Fishery is able to operate without reporting	Individual fails to report as required and/or goes unpenalised	Community does not collect or hides or misrepresents fishery information	Nation does not collect or hides or misrepresents fishery information	Inadequate information sources OR Inadequate institutional arrangements
UNREGULATED a) Fishery can operate without control b) Fishery is uncontrollable	Uncontrolled individual entrants, and no reporting requirements Participants uncontrollable	Community can operate uncontrolled, locally and distantly	Nations fail to establish regimes for shared stocks, or Allow their flag vessels to operate outside management controls	New fisheries, particularly high seas, are allowed to operate without reporting or interdiction No mechanisms for international MCS