Web-Based Fisheries Information System Engineering

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***Abstract*- Fish resources have limit, although could be recovery, but natural ability to recovery is limited. If human explore fish resources continuously, surpass ability to recovery then fish resources to recovery needed long time, so that fish resources have decrease, even extinction. Hopefully fish resources still existence, needed accurate data and manage of fish catches, so we have information about fish catches as database. Information availability about fish is one factor support to fish resources management. The purpose of this thesis is designing web information system to manage fish catches from TPI (First Point of The Collected Fish), with scope of calculation to prediction potential fish (MSY) and fishing effort capacity (Fopt). By analyzing relation fishing effort with catch per unit effort. While development method system use waterfall model, because on the waterfall model system to be finished first, if need be corrected repeat from beginning. Web based fisheries made with php language, mysql database, equipped sms gateway gammu 2.5 version. Input data of fishing every day from TPI (First Point of The Collected Fish). System will be count automatically data every month and show in the web. Consist of production, fishing gear each trip, production of fishing gear, catch per unit effort and MSY graphic. When the condition Trip <= Fopt and Production <MSY are met the system will send an SMS (short message service) that waters in underfishing condition, if not met the system will send an SMS (short message service) that the waters in overfishing.**

Keywords : Fish, Information System, TPI (First Point of The Collected Fish), Web.

I. INTRODUCTION

A. Background

Fish resources including biological resources are limited, although it can recover, but the natural ability to recover is limited. If humans exploit fish resources continuously, exceeded limits its ability to perform the recovery of fish resources will decrease the number of even extinct. In order to fish in the sea resources needed to stay awake fish catch data are properly managed so that available information on fish catch data. Availability of information about the catchment is one of the factors supporting the management of fish resources.

Information fishery potential are not widely known by the fishermen. Lack of information caused a routine fishing in the same area, while elsewhere the densest surplus fish resources untapped. One of the very dynamic nature of fish resources, can change rapidly in accordance with the conditions of space and time and vast ocean. Management of fisheries resources in a responsible manner can be done through an information system. Such information will become the base material in an attempt to gain an overview of the condition of resources in the form of qualitative and quantitative. So with the data control on the exploitation of fisheries can be monitored easily. Fisheries data processing method used refers to the concept of information system software. In this case, to be built is a model estimating the potential and capacity of fishing effort. To estimate the potential sustainable (MSY: Maximum Yield Suitanable) and optimum effort (fMSY: Sustanable Force on Maximum Yield) by analyzing the relationship fishing effort (fishing effort) with the result of union efforts to catch (catch per unit effort).

B. Problem Formulation

- How to make fish catch data processing system which can provide information about the potential for sustainable fishing.
- A case study is how the local government district. Kendal and Semarang city using information from the fishery system, so it can manage a sustainable fishery.
- How can the system inform the condition of waters which exceed the catch limit, so that certain fish species in critical condition (nearly extinct) may be monitored or informed via sms alerts.

C. Problem Limitation

- This information system is not based on spatial (map).
- Sms are providing information that the area or those waters are experiencing overfishing, and sms only be sent to interested parties, especially fisheries agencies to information and control on its territory.
- In the implementation is generated or sent sms alerts based on data inputted by officers from the TPI.

Designing a web-based information system (online) for processing of fish catch data from TPI to the scope of the calculation by estimating the potential fish (MSY) and fishing effort capacity (fMSY). The result serves as information for analysis and control of fisheries exploitation.

II. SYSTEM DESIGN

A. Requirement Analysis

Requirement of the user system can be seen in the following table

No	Requirement	Aplication
1	Login	location area Login of the service area
2	Entering Data	Form data entry of production, fishing gear every trip, every production gear
3	Prosesing data	Calculation of the data is automatically performed by the system by estimating the potential fish (MSY) and fishing effort capacity (fMSY)
4	The information provided	- sustainable potential Information of each month - Notification to the department that occurred waters overfishing

Analysis of the system hardware requirements can be seen in the following table

No	Requirement	Hardware dan Software
1	1 Unit Computer	- Pentium 4 processor - Memory 1 GB - HD 80 GB - Monitor 15' - Keyboard + Mouse
2	SMS Gateway	- Mobile Siemens C55 type - USB Data Cable C55 Bluetech

Analysis of the system software requirements can be seen in the following table

No	Requirement	Hardware dan Software
1	OS	- Linux - Windows XP
2	Browser	- Mozilla Firefox 3.5
3	SMS Gateway	- Gammu 1.25

Requirement Analysis in general system design can be seen in the Figure 1.

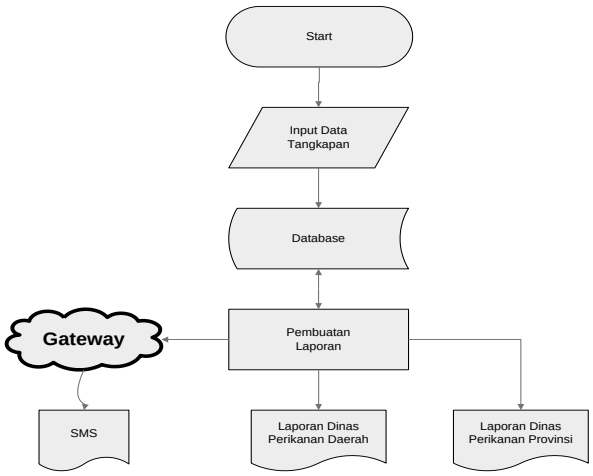

FIGURE 1. THE DESIGN OF THE OVERALL SYSTEM

B. Designing

1). Structure of the Applications Menu

Menu structure that will be made visible in the picture below

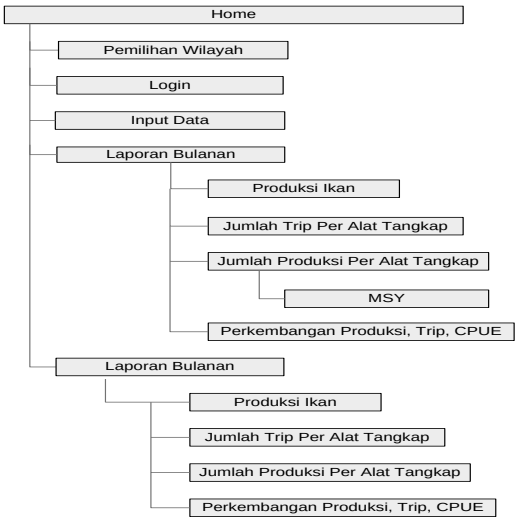

FIGURE 2. DRAFT STRUCTURE MENU

2). Designing Interfaces

Once the menu system is made, details of the interface can be seen as follows:

FIGURE 3. MAIN PAGE

3). Database Design

Database on this system follows the following data flow diagram

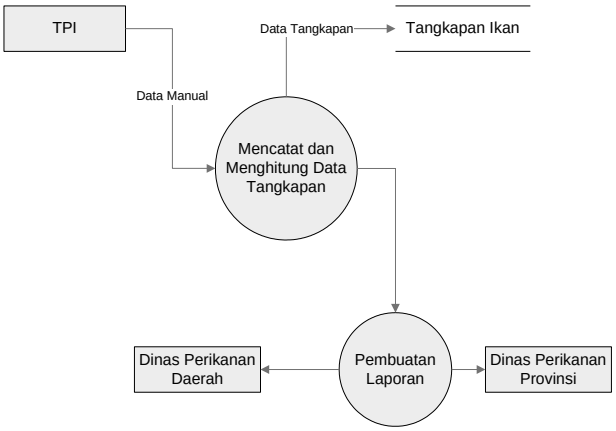

FIGURE 4. DATA FLOW DIAGRAM

C. Implementation

The algorithm in finding MSY and fMSY as follows:

- Identify or classify according to the groups of fish production, pelagic or demersal fish and then create a table of production in a series of time (months)
- Calculating the value of CPUE (Catch per unit effort) of each gear with the formula:

$$\text{CPUE} = \frac{produksi\ per\ alat\ \text{tang}kap}{trip\ per\ alat\ \text{tang}kap} \quad .....(1)$$

- Create or standardize the fishing gear, start by selecting a gear that became standard gear by considering the main target fish and the availability of data after another
- Calculating the value of FPI per fishing gear by the formula:

$$\text{FPI} = \frac{CPUE\ alat\ \text{tang}kap\ non\ \text{stan}dar}{CPUE\ alat\ \text{tang}kap\ \text{stan}dar}$$

FPI : Fishing Power Indeks

- Calculating the value of the standard trip each year by the formula:
- Trip standar = jumlah FPI × trip alat tangkap standard
- Calculate the optimum value of MSY and f for each model using the formula:
  - model Schaeffer:

$$\text{MSY} = \frac{a^2}{4b} \text{ dan } f_{opt} = \frac{a}{2b}$$

a is the intercept (the point of intersection of the regression line with y-axis)
b is the slope (slope) of the regression line

The graph below describes the steps to analyze regression with intercept (a) and slope (b) and correlation (r)

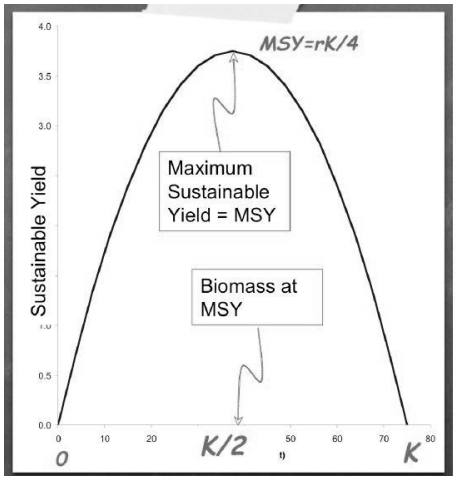

FIGURE 5. GRAPH SHOWING THE RELATIONSHIP CPUE BY FISHING EFFORT

III. DISCUSSION

A. System testing

Tests conducted on a small scale system by entering dummy data. If data has terinput then the data will be processed by the system, then produce MSY and Fopt. At the time of the "production <MSY and trips> = Foptimum" not met then the system will send an sms to the agency, this means the program has enabled alerts that indicate the program has been running fine.

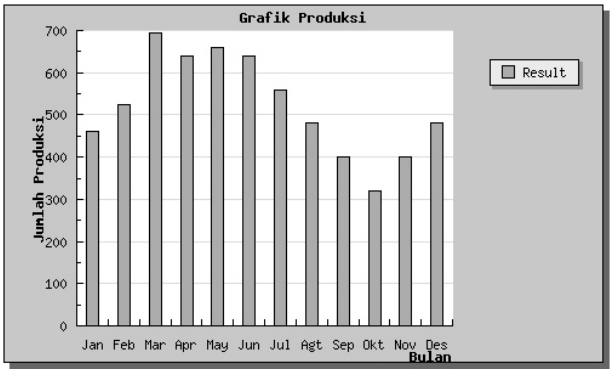

FIGURE 6. GRAPH OF FISH PRODUCTION

Figure 6. Provide information about the number of fish production presented in structured tables and sorted by month and the number of fish production in each month.

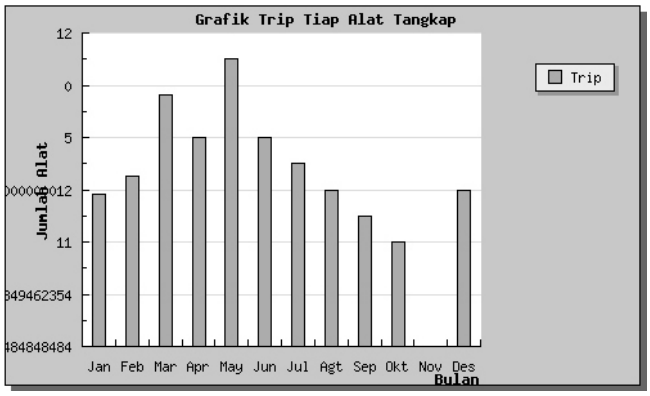

FIGURE 7. GRAPH EACH TRIP GEAR

Figure 7. Provides information about the fishing gear used by fishermen in their activities. Presented in a structured and informative at each month.

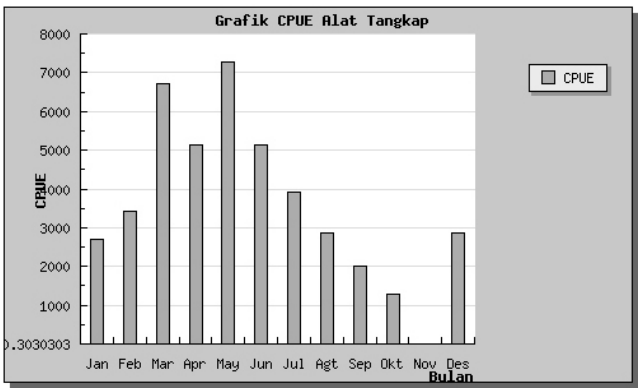

FIGURE 8. GRAPH CPUE

Of the three lists that can be seen in Figure 5-8 can be plotted graphs MSY, which can be seen in Figure 9

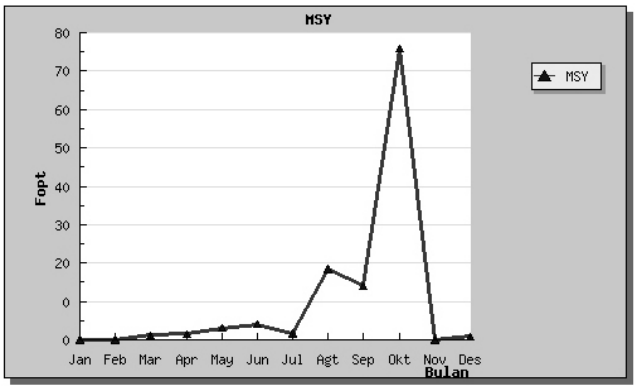

FIGURE 9. GRAPH MSY

The advantages of this information system is any data that goes into TPI catches will be recorded into the system, and each month the system will calculate MSY so if there is overfishing would be appropriate for improving management policies, which are still in line with national and local policy particularly in generally, because these systems transmit news by sms to the parties concerned in the management of fisheries (direct information). As for access to be made in such a simple system that can allow a user in inputting, read and infer systematically, because the results are presented in tables and graphs.

B. Utilization of Information Systems for Sustainable Fisheries Management

The value of MSY is used as the basis for managing fisheries in a region where sustained. Also MSY is also used to generate sms alerts, ie when overfishing (Trip <= Fopt and Production <MSY) then the system will automatically send an sms to the parties concerned. From the data transmitted can be acted upon to anticipate the occurrence of overfishing and control lestarinya existing fish resources.

Implementation of the field in Semarang city and Kabupaten kendal during the study, it is known that the amount of fishing gear which brought fishermen to catch fish by TPI are not reported to the Regional Fisheries Office, but directly to the Provincial Fishery Office, so that the Regional Fisheries Service can't calculate MSY region. Management of Information Systems in both areas are not on duty but on the sub bag PDE (Electronic Data Center). The whole service that exist in the area of data management is integrated in the county or city in general, so that fisheries management has yet to reach the target. The absence of awareness about the importance of information and dissemination of technology, causes no synchronization between the data in an area with a centrally located data. In this case need to be observed that many human resources should be competent to support and participate in the application of information systems as part of the socialization of technology, but those needs unmet.

To be more efficient, each groove bureaucracy should get the same information. So as to facilitate coordination and confirmation in the management of existing natural resources. Thus the design and results of information systems can be enjoyable and useful for society, governments and research in the field of science

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C. Aquatic Condition Information Via SMS Alert

Each month the system will automatically calculate the maximum limit fishing in the waters. The data presented in the form of values and graphs, if the waters are experiencing conditions of catching more (MSY threshold) then the system will send an sms to the local fisheries department, so that agencies can take steps and remedial measures in managing fish resources based on real data conditions of the waters.

V. CONCLUSION

Web-based fisheries information systems can be run with data derived from TPI in Kendal district and the city of Semarang. The information system also features SMS alerts so that when the critical water conditions, the system will send a message to all stakeholders in this fishery agencies to take steps to improve the solution-based management of fish resources. This application still needs to be tested in a long time (at least twice a season cycle ± 2 years), so that can know the benefits for sustainable fisheries management.

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