CJES

Caspian Journal of Environmental Sciences

[Short Communication]

Information and data flow analysis for forestry sector in Iran as a basic requirement for designing a forest information system (FIS)

A.Mahdavi[1] and R. Naghdi[2*]

1- Department of Forestry, Faculty of Agriculture, University of Ilam. Iran.
2- Department of Forestry, Faculty of Natural Resources, University of Guilan, Sowmehsara, P.O. Box: 1144 ,Iran.
* Corresponding author's E-mail:rnaghdi@yahoo.com

ABSTRACT

The aim of this study was to evaluate the status of information on forest and data transfer and to identify the gaps in information and data flow in forestry sector in Iran. The study evaluated the data and information flow in three levels (control offices level, provincial offices level and organizational offices level) using the document analysis and questioning (interviews and questionnaire). It has a major outputs; identification of the gaps in information and data flow to sustainable forest management and also can be used as a prerequisite to designing a forest information system.

Keywords: Information, Information flow, Information gaps, Information system, Database.

INTRODUCTION AND PROBLEM DEFINITION

The value of information as a production factor is well recognized. Data and information are of no value unless they reach those who need them, can be easily understood and are actually used (1). Having adequate well-presented information will improve the efficiency of forest development projects. It will improve the implementation of forestry plans through improving the capacity of managers to put due consideration to the principles of forest development plans namely, sustainability, effectiveness and looking forwards.

Because of a long negligence and inadequate attention to forestry information and information system, forestry sector in Iran has faced some problems to provide management with information that can provide the necessary input for gainful decision and policy making, for planning, appraisal and evaluation of forestry project/programs and to monitor and manage day to day activities. However, in comparative sense, what might be lacking in forestry sector is not forest information but their management (the

capacity to systematic process, store, retrieve, disseminate and document forest information) and the corresponding capacity to use them efficiently.

The prerequisite to designing an information system is to clearly define or redefine the information needs and to identify the existent information and the process of data gathering and data flow as well. This study describes such analysis on information that is being collected and data transfer at the present state of forestry sector in Iran as a basic requirement to designing a forest information database.

METHODOLOGY

The General provincial natural resources office of No-shahr was chosen as sample site. It can be as a representative for other general offices in north of Iran.

The procedures used for information requirement analysis in this study are combined and integrated from the document analysis and questioning (interview and questionnaire).Primary data for analysis were gathered using an interview schedule that some of questions are listed as follow:

• Duties and responsibilities within the organization
• Vision /mission / objectives of the organization
• Types of report at the different levels of the Organization (territorial to top level)
• Originator of the report
• When and where the reports are submitted and frequency of reports are submitted
• Manner in which reports are submitted
• Database maintenance
• Problems encountered in terms of data and information management and so on.

Interviews were conducted with officials concerned at the different levels of the organization. Those interviewed at the study site had a wide range of responsibilities and positions at the provincial and organizational offices (table 1).

They included planning and information officers and staff from different units such as plantation and parks office, harvesting and wood industries office, forestry technical office, supervisors of the forest management plans and so on. Different offices of each level of the organization were studied in terms of activities on data gathering, organizing, input and maintenance. The type and amount of data collected were noted through interviews with personnels. Data transfer and information flow from the field level (control offices of forest management Plans) was evaluated as these are transmitted to respective offices of the general natural resource office, from general office to respective offices of Forest Deputy in the FRWO and vice versa.

RESULTS
The Field Level (The supervisors of the forest management plans)

The supervisors or controllers of the forest management plans are the first point in the field that the information flows from there to upper levels of the organization. They are as representatives of the general natural resource office control on all activities of the executives or contractors that are operating in the forest management plan area. This control is based on booklets of the plans in which different activities and operations anticipated such as, forestry, harvesting, silviculture, stand tending operations, re-forestation, construction of roads, and so on.

The data and information that are collected at the field level are shown in the table1.

The General Natural Resource Office Level

Almost all information that there is in the field offices level can be fund in the general natural resource offices with some more extent. The controllers of the forest management plans regularly report the physical progress of the plans to technical division in the general natural resource office then the reports are recorded in computer unit of the office. Table2 listed the existent information and the reports that are sent from the general natural offices.

The Organizational Level

Provincial General Natural Resources Offices, report the progress of implemented activities to respective divisions in the organization, monthly. Each division holds this information separately. The planning and monitoring and statistic division at the end of each fiscal year compiles necessary information for making composite annual report to forward to the Ministry of Jihad – e - Agriculture and national planning commission. In the table3, the current information and reports in the organization level is shown.

The gaps in attribute data and special information

Within the forestry technical division of the organization and the general natural resource offices there is a small GIS unit that mainly caters for needs in mapping and data management for watershed management projects.

The using of GIS in forest management was started from 1991 (9). From 1998 to 2001 it carried out a study on the use of GIS as a supporting system for providing forest management plans. This study established a fixed sample plot grid for 103 watersheds of the northern forest. It also included different special layers (shape files of watersheds, districts, parcels, roads, boundaries and villages in the forests). A GIS database is available in Arc View format. There are digital maps of forest cover and the location of sample plots on maps.

Table1. Data and information at the field level (3).

Data and information

- All information about harvesting Operations (marking, re-measurement, Sorting of Wood products, transfer Licence, clean certification)
- List of felling licensees
- Information about reforestation and   Stand tending operations
- List of workers and contractors

Reports

- Monthly Wood productions and disposition report (25th)
- Monthly reforestation and stand tending operations report (25th)
- Monthly physical progress of the forestry plan report(25th)
- Quarterly physical progress of the forestry plan report(25th)
- Monthly (5th) protection and conservation report by the natural resource offices to the general natural resource office

Table2. Data and information at the general natural resource office level (3).

Data and information

- Data and information on forestry operations Such as physical progress of forest management Plans, volume of wood products, plantations
- Data and information on forest protection activities Such as confiscated logs, fire, pests, cases filed in court, Deployment of forest guards
- List of felling licensees
- Information about reforestation and Stand tending operations
- List of employees, workers and contractors
- Information about rural community and their livestock in the forest area
- Information about forest management plans and Integrated resource management plan
- Maps of the management plan areas and other areas

Reports

- Monthly(10th), Quarterly, Annual disposition and production report
- Monthly, Quarterly Annual physical progress of the forestry plan report
- Monthly (10th), Quarterly, Annual Forest protection report
- Monthly(10th), Quarterly, Annual reforestation and plantations report
- Monthly revenue report

Table3. Data, information, reports in the organizational offices level (3).

Data and information

- History of the plantation and parks office (PP) activities / projects / programs (in computer and excel table)
- History of the harvesting and wood industries(HWI) office activities (from 1997 in annual booklet)
- History of the forecasting of the forest wood products (from 1980 in booklet)
- The conservation and protection office activities
- Information on different working management plans and their executives, their facilities, personnel, (booklet)
- The forest management plans booklets for the northern forest
- Maps on the various projects/ activities and the maps of forest cover for the northern forest.
- History of the organization operations from 1995 (annual booklet)

Reports

- Quarterly, annual reforestation and plantations report to the plan, program and statistic (PPS) office
- Quarterly, annual, production report to PPS office
- Quarterly, annual, protection and conservation activities to PPS office
- Quarterly, annual, HWI office revenue to PPS office
- The Annual Organization Operations Report
- Occasionally reports of different offices

Unfortunately, there are not enough computer specialists for GIS database, although some GIS encoding is pursued through geo-referencing of important GPS points. Special data are either generally unavailable poorly maintained, outdated, or incorrect. Spatial information is not defined in a consistent manner and therefore, of low quality. Data are not archived in such a way that they are available for use in later use. Despite its availability, GIS use lacks analytical form for the following main reasons:

•the poor understanding on the basic concepts and principles of GIS.
•insufficient training for personnel.
•shortage of funds prohibitive to establish a comprehensive GIS system.

Gaps in data transfer and information flow

Reports are submitted via fax, post, telephone or by hand. For the maintenance, reports are kept in filing cabinets in every office and some statistical information are stored in the excel tables. Altough, almost all the organizational and provincial offices have a computer but some staffs are not familiar with the use of computers. There is not enough training facilitates for the staff to improve their qualification. There is no computer network for transfer the reports or information. Occasionally, the office either in the organization or the general office must reports the same information for different divisions in different format. It causes wasting the time and cost for preparing and filling different form. Sometimes, there is a delay in submitting the reports, because some forestry officers have not accorded data and information a high priority. They are less concerned about the importance of the accurateness and the completeness of the forest data and information which affect timeliness, and eventual accuracy of reporting.

Within the context of the existing reporting system there appear to be no gaps because the reporting system in followed studiously and cumbersome.

The status of different forest information in the forestry sector of Iran

The forestry data and statistics are currently collected in multitude quantity, varies in scope and details, sources and method of collection. Nevertheless, they can be broadly classified into the following categories:

• **Forest resources inventory**

Forest inventory activities carried out by the forestry technical office. There are different forest resources inventory for different purposes. The forest inventories in Iran can be divided into 2 major parts as following:

National forest inventory

The first national forest inventory was carried out by a group of Iranian experts under the supervision of Dr.Rajerz in 1958. In this study the north forest was divided into 18 units (except Talesh area) and into a total 753 sample plots (1000 m2) in the field and 8,310 sample plots on the aerial photographs were measured.

Then the results were generalized to total north forest area. The fifth national forest inventory was carried out by the forestry technical office in 1996. The results of this investigation were based on 5000 fixed sample plots that were located systematically on the U.T.M network. In table 4, the abstract of conditions of the studies in different periods is shown.

Table4. Abstract of National Forest Inventories conditions in different times (7, 8, 10).

Number	year	Supervisor	inventory method	Type of Plot	No.of Field Plot	No.of Aerial photo Plot
1	1958	Dr.Rajerz	Double sampling	Fixed	753	8,310
2	1973	Dr.William	3P	Fixed	753	….
3	1974	Yakko Poeyry Firm	Randome	Moveable	1,264	….
4	1985	Mr.Najaran	Systematic	Moveable	15,000	…..
5	1996	Mr.Moshtagh	Systematic	Fixed	5,000	…..

Forest inventory for provision the forest management plans

Forest inventory activities are carried out by the forestry technical office. The forest inventory for the forest management plan is carried out once every ten years. The inventory would define the extent and location of the forested areas and classify them by forest types and broad volume categories. This inventory employs data gathered from sample plots measurement in the field and maps. The area to be inventoried is selected on the basis of field survey. All possible data are collected in order to provide a sound base for the decision- making process in management planning.

•Statistics on forest plantation

Data for forest plantations is only available for those plantations that are on government budget. The sources of information are from the General Provincial Natural Resources Offices that keep records on annual tree planting activities.

Forest plantation records are kept and maintained by the Provincial Plantation and Parks Office and Organizational Plantation and Parks Office involved in plantation establishment. Data on the area planted, year, costs and list of contractors are compiled and submitted to the forest plantation unit of the organization in Chalous those co-ordinates the impleme-ntation of the plantation projects.

The government has strongly promoted reforestation and tree planting activities, with the aim of increasing forest cover year by year. The promotion of forest plantations targeted the annual planting programme of 20,000 ha and the target to be achieved by 2020 is approximately, 500,000 ha (6).

Some of the key problems of this information are listed below:
•the absence of information on the choice of species, especially where site-species matc-hing is involved.
•a lack of information about the steps of progress and the mortality of the plantations.
•the lack of spatial information about the plantation.
•the lack of standardization with regard to seed sources, seed technology, nursery and planting practices, and etc.

•inadequate data on growth rates of indigenous species.

•Statistics on forest harvesting and timber products

The Harvesting and Wood Industries (HWI) office is responsible for collecting timber products information. This infor-mation is gathered from reports issued by the general offices.

The key problems are:
●the repetition of the same information in different levels and different reports.
●the lack of specific format for storing and reporting such a information.

•Revenue collected by sales of forest products

The HWI office is responsible for collecting information on the revenue earned of forest products. The information comes from the monthly reports of the general offices given to the HWI office.

•Statistics on timber trade

Information on timber prices, export volume by species group and destination, import volume by product type and point of origin are collected by the Ministry of Trade through the customs office. This information is disseminated for both national and international use through the Annual Statistical Reports of the Customs Office. The export of timber and timber products from Iran amounted to 11,465,899 $ and the import of timber and timber products to Iran equal to 77,754,892 $ in 2002 (2).

•Statistics on forest or timber-based industry

From **1991**, the Harvesting and Wood Industries Unit of the Organization took action to collect information on the operators of the forest or timber-based industry (e.g. sawmills, plywood/veneer mills and paper mills). Information was also collected on the number of removal passes, species, volume input into the mills, volume input into the processing machinery, output of converted timber and sales of timber to markets. The information is collected by the HWI unit of the organization either through the mail or on-site inspections. This process takes about 4 months every year.

With reference to wood-based industries in Iran, there are about 52 big productive mill units including, plywood mills, paper mills, pulp mills and there are about 40,000 small mills engaged with wood and wood products. The total capacity of the big mills is estimated to be about 2.3 million m3. However due to the lack of the required wood and utilization rates, the annual official production has been around 1,435,000 m3 in 2002. The total capacity of the large and small mills is estimated to be about 3,700,000 m^3. (3).

• **Fire and other incidents**

The data on forest protection activities such as fire, pests, disease, forest offences are kept in the conversation and protection office. The sources of this information are the monthly, quarterly and annual reports of the general offices.

• **Number of families staying in the forest as squatters**

There is a provincial plan to send out the rural people and their livestock from the northern forest. The plan started in 1990 and was intended to prevent the degradation of the northern forest. It was also designed to increase of wood production, decrease the destruction factors of distributed livestock in the forest and change the means of livelihood of forest rural community. In this direction, a special office was established. This office collects information on number of families staying in the forest and their livestock. Based on a study in 2000, there are about 4,848 cowsheds including 747,310 domesticated animals units. 52% of these amounts are cows and 39% sheep and 9% goats. About 5000 families are currently living in this forest area (5).

• **Fuel wood production and consumption**

Fuel wood production and consumption are based on official studies and estimates. Nevertheless, the figures seem rather low. The total annual local consumption for fuel wood is estimated to be at about 2 million cubic meters for the north of Iran. (3).

• **Trees outside forest**

Information on trees outside the forest is not collected. Based on only one study conducted by harvesting and wood industries office in 1996 on populus plantations, these plantations produced about 2 million m3 wood(3).

• **Non-wood forest products (NWFP)**

Other than some studies on the potential of NWFP this information is not collected.

DISCUSSION

Reviewing the current state of collection, collation and dissemination of forestry information in Iran, it can be stated that the establishment of a national FIS can best be described to be in its infancy, Although the organization will to constructs a comprehensive and systematic mechanism for collection, collation, analysis and dissemination of forestry data at the national level. There are not common formats for information exchange between institutions and offices and enough effective established mechanisms for partnerships. Information is scattered with various institutions and lacks a robust quality and credibility check mechanism. As there is not a clear demarcation of information areas between institutions due to the lack of a holistic national plan, there are some times considerable overlap on subject areas on which information is being collected or disseminated.

The data sources are not well defined and the methodologies and procedures used for data collection are also generally inadequate and seemed to don't meet the objectives of data needs of the FRWO. Mechanisms of dissemination are extremely poor and in a large part manual through reports which reach a very limited audiences. Constraints on manpower and budget together with amount of work to be done, reports are sometimes perceived as low priority (if not least priority). The need for data entry and verification at multiple levels (from the field, provincial offices to the FRWO) posed serious limitation as it greatly undermines the objective of a fast, timely and accurate data collection and compilation system.

There are numerous important aspects of forestry like trees outside the forest, NWFP, unrecorded removal of timber, etc. in which there is not much available information.

It also needs to be emphasized that currently, there is hardly any credible

national level information available on many very important aspects of forestry. The Sustainable Forest Management process for example, with its emphasis on criteria and indicators, is relatively new to the Iranian forestry sector. In order to initiate and implement SFM programmes, a large quantum of information on specific aspects of forestry is required. Some such areas where information does not exist but which would be critical for SFM programmes and lack of such information can severely impact SFM initiatives in Iran are listed below:

•Area, location and percent of forest land having erosion hazard.

•Area and percent of forestland with diminished or improved biological, chemical and physical components.

•Status of forest flora in terms of threatened, rare, vulnerable, endangered or extinct.

•Inventory of NWFPs in terms of diversity and yield.

•Recreation and tourism.

Thus, there is a dire need to a system to systemize data and information collection, retrieval, updating and reporting even on a manual basis, if such a system is in place files and reports can be accessed easily and data duplication and waste of time can be avoided, but the importance of a fully computerized data capture, analysis and retrieval system which will greatly reduce manpower requirement, time taken and most important of all errors in data entry and analysis can not be overemphasized.

REFERENCES

Custom office. (2002) '*Annual Statistical Reports of the custom office of Iran'*. pp. 200.

Documents and information of Harvesting and Timber Industries Office (HTIO). pp. 100.

Forest range watershed organization, (2002) 'Annual operation report'. pp. 150.

Ghiassallhossini, A. (2000) Evaluation of the effects of the organizing plan to sending out domesticated animals from the north forests in Iran' Centre of science and research of Azad *University of Ahvaz*. M.Sc thesise. pp. 130.

Hedayati, M.A. (2003) *Plantation in north of Iran (purposes, policies, and future plans)' Plantations and parks office*, report of plantation office. pp. 40.

Najaran, (1988) *Integrative plan of northern forests'*, Forestry technical office, Forests Range Watershed Organization. pp.107.

Rajerz, (1964) *Statistic of Caspian Forests'*, Technical office, Ministry of Natural Resources. pp. 86.

Rassaneh, Yadollah (2003). '*Forest Typology*' Forestry technical office, FRWOI. pp. 109.

Solvberg, A. and Kung, D.C. (1993). *Information systems engineering*, Springer Verlag, Berlin, Germany. pp. 268.

Yakko P.F. (1974) *Integrative plan of Caspian forests'*, Forests Rangelands Organization, Ministry of Agriculture. pp. 133.