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SUMMARY - This paper describes the Aquaculture Planning Simulator (APS) module of the two aquaculture information systems of FAO, SIPAM and SIPAL. The APS, developed using the Borland dBase IV, is the analytical tool of the two aquaculture information systems for evaluation of project proposals through a comparison of both technical and economic parameters against similar projects already in operation and whose data are included in the data entry of the APS module. The design characteristics of the module are explained, and a brief indication of how the first release of the module works is also provided. The APS design allows both a technical and a financial tuning of the project proposals and is intended for use by the private sector, banking institutions, and government offices responsible for aquaculture development.

Key words: Aquaculture, economics, technical descriptors, software, information systems.

RESUME *- Ce travail décrit le module Simulateur pour la Planification Aquacole (SPA) des systèmes informatiques pour l'aquaculture de la FAO, le SIPAM et le SIPAL. Le SPA, développé à partir du Borland dBase IV, est l'outil analytique des systèmes informatiques et sert à l'évaluation d'avant-projets à travers la comparaison des paramètres techniques et économiques avec ceux de projets similaires déjà en opération et qui sont récupérés de l'archive SPA. On décrit les caractéristiques de conception de ce module et on indique brièvement comment le module travaille. L'application du SPA permet une amélioration soit technique soit économique de la conception de l'avant-projet examiné et est destinée à être employée par le secteur privé, les banques et les bureaux responsables du développement de l'aquaculture dans le secteur public.*

Mots-clés : *Aquaculture, analyse économique, descripteurs techniques, logiciels, systèmes informatiques.*

FAO AQUACULTURE INFORMATION SYSTEMS

The first FAO aquaculture information system was developed in 1989 at the end of the first phase of the Latin American Regional Aquaculture Project AQUILA I. The system, extended in 1992 to the Mediterranean region through the MEDRAP-II project, had the objective of establishing a permanent and reliable regional information system to facilitate the exchange of information on all aspects of aquaculture of interest to the beneficiaries, such as status of production, markets, regulation, technology, etc. The two systems, SIPAL for Latin America and SIPAM for the Mediterranean, were conceived as tools to allow the management of data and information of different nature retrieved from the various national regional and global sources.

In order to rationalize the development of the systems, they were conceived as five main and two accessory sub-systems, namely:

- National sub-systems
- Regional sub-systems
- FAO sub-systems
- Extended subsystem
- Analytical tools and

- Processing system and
- System maintenance

During the first phase, five countries participated in the elaboration of the prototype for Latin America and eight countries (Croatia, Cyprus, France, Greece, Egypt, Portugal, Tunisia and Turkey) intervened in the development of the Mediterranean prototype. The regional centres which receive and compile the data from the participating countries are located in Mexico City for SIPAL and in Tunis for SIPAM.

The end users of the aquaculture information systems are classified into groups according to their position and fields of interest. The primary end user is the staff of the fisheries and aquaculture services of the national offices who will use SIPAM and SIPAL mainly for reporting and planning purposes but also for answering queries from the private sector. This group is the most important for data supply to the systems. A second group of users are aquaculturists/economists, fisheries specialist traders and investors in the industry, and trade and educational institutions, both in the public and the private sectors. The SIPAM management units would organize their own national end user group.

A characteristic of the SIPAL and SIPAM modules in this first phase is that they were no expert systems; the information is provided for the interpretation of the final user.

The paper by D. Lacroix in Section VI gives a more detailed account of the status of development of the SIPAM system, which has already passed the phase of prototype.

THE DESIGN OF THE AQUACULTURE PLANNING SIMULATOR (APS)

When the first prototypes of the two information systems were being finalized, it was felt that there was a need for an analytical tool which would enable the evaluation of new project proposals in terms of their technical design as well as operational and financial parameters, by a comparison with data collected from similar projects already in operation.

The design of a new module for planning of aquaculture projects, termed Aquaculture Planning Simulator (APS), was initiated under the AQUILA II project, in collaboration with the Italian aquaculture firm Servizi Tecnici in Maricoltura (STM), and adopted by the MEDRAP-II project at the meeting on the development of the SIPAM prototype held in Rome in May 1994. This new APS module was conceived with three potential users in mind:

- The aquaculture planning officers in the governments, who might be interested in a comparative analysis of the various production models.

- The banks, which could make use of a data bank including the main parameters of existing projects in order to evaluate the validity of the proposals submitted to them for financing;

- The private sector, which might be interested in obtaining information to improve the design of new projects or in comparing the performance of their projects with that of other projects in the area or working with the same species;

The initial discussion on the APS contemplated the possibility of taking the necessary data for comparison with existing project from the various data banks of the SIPAM/SIPAL systems. However, the early stage of development of the two systems prevented this possibility; therefore, in order to be able to have a functional module from the very beginning, the APS was designed to perform individually with an independent data entry (DAE). The DAE would be filled through interviews with operators of existing aquaculture farms by using a specific questionnaire and strictly maintaining the confidentiality of the data gathered. These questionnaires would include information on the type of infrastructure available, the species cultured and the way in which the culture was implemented, the financial data related to infrastructure and operational costs as well as the way in which financing was secured for the projects.

The DAE would have to be filled by the various national groups participating in the SIPAM/SIPAL systems through initial surveys, for which a special effort was required.

The first APS release

In order to be able to distribute the software without the need for a special environment and to limit the size of the programme to a maximum of 2-3 disks, the Borland dBase IV was selected as programming tool for the APS. The use of a relational data base would allow the design of specific filters grouping projects

under different criteria for comparative purposes with the new proposals being examined. A facility for performing a partial economic analysis of the proposed project (profit and losses account and estimated overdraft requirements) has been included using the calculation capacity of the Borland dBase IV.

The version which is being presented at this meeting is a Beta release, still at an experimental stage, which is going to be distributed selectively for comments and for which future upgrading is envisaged. It is nevertheless thought that, in its present version, the capabilities of the APS are sufficient to attract interest from the various groups of potential users.

Hardware configuration

The APS programme can, in general, be utilized with any IBM PC or compatible machine using the MS-DOS 3.3 system or a newer release. It is designed to work with a minimum of 640 kBytes RAM and has a limited hard-disk space requirement. At present, the programme has been compiled in two version which work at 16 and 32 Bits. The reason for the two versions is to ensure the widest possible distribution to users having different configurations of hardware and to speed up the response time of the machines. In order to use the 16-Bit version, it is sufficient to count upon an INTEL 80386 internal processor with 4 MBytes RAM, while for the 32 Bits version an INTEL 80486 with 8 MBytes RAM is recommended. As for hard-disk drive space, at the moment 6 MBytes are sufficient. However, with the progressive input of data into the DAE more space will be required.

HOW DOES APS WORK?

The APS has been developed to assist a user with limited knowledge of the sector in the analysis of the information contained in project proposals and their comparison with data collected from existing aquaculture projects.

Each project proposal must be entered using the project identification section and could be elaborated through a simulation phase which compares the entered data with those of similar projects already in operation and grouped in a homogeneous way according to the species cultures, type of technology, geographic area, etc. This comparison could be effected in different ways as the user can also decide which of the projects in the DAE should be used for the comparison and how they should be grouped.

Once the simulation phase is started, the eventual discrepancies between the project proposal and the data collected from existing projects could be progressively corrected in order to obtain a technically feasible design. Once the technical design of the project is completed, the APS allows for a financial analysis of the data introduced spanning over twenty years from the start of the construction of the aquaculture farm. The programme does it by recovering from the technical data section all the indications of economic nature which could be useful for the financial analysis. From the proposed project design, the APS can simulate scenarios, both technical and economical, generating several versions of the proposal and eventually carrying out a financial analysis of the various

hypothesis. Help-functions are provided for almost every field in order to assist users without much experience in this type of programmes.

Technical input of project proposals

The input of project data requires information to be entered in four different sections:

- General identification of the project
- Infrastructure characteristics for production
- Technology used for production
- Main economic parameters

Each section is physically separated from the others, and before moving into the next section the user is requested to fill as many fields as possible. The programme allows fine tuning of every section, and data can be entered at various stages.

The nature of the information requested by the programme sections is different; some data, which we could define reference data, are useful to differentiate projects. For instance, they allow the classification of the farms into different categories, i.e. by species under culture, by technology employed or by the final destination of the product of the farm, by geographical location etc. Some other data are or could be useful in future for calculation of parameters for the comparison of technical data or for economic calculations; these are calculation data, which incorporate parameters related to production technology or the data on specific costs. The last group are data which could be termed informative and which have a dual purpose: they are directed to the user to verify the consistency of the information at disposal on the project and to cross-check data entered for different fields.

At present, none of the data are strictly necessary for the analysis of the project, However, it is obvious that the more data are entered, the more accurate the analysis will be. For some fields the user is required to make a selection amongst the various options which appear on the screen.

General identification of the project

This section includes the data which identify the project. The majority of the data are essential for the simulation since they refer to the geographical location of the project, species to be cultured and main parameters of the culture techniques to be employed in the project and expected results. These data are necessary later to create the automatic filters from the DAE to compare the proposal with existing projects.

In this section the programme requests information on:

- the **geographic location** and **full address** of the project,

- the main **classification of the territory** where the farm is going to be established,
- initial **surface** of the farm, final surface and maximum available surface,
- type of production, under which the **group of species** to be culture is selected (finfish, mollusc, crustaceans, amphibians, reptiles and seaweeds)
- whether the farm is going to operate **monoculture or polyculture** (the programme can handle up to five species in polyculture)
- name of the species to be culture
- whether the farm is going to have **hatcheries and grow-out or only one** of these two categories, or whether **ranching** is going to be the main destination of the production,
- type of operation in relation to **intensity level**,
- expected **productions**
- type of **investment and scope**
- **final market** for the production of the proposed farm.

Infrastructure characteristics

The information requested to the user in this section refers to the main construction parameters and to the equipment to be utilized in the farm. It contemplates farms in which both hatchery and grow-out phases are included and it allows the identification of the more important section of these two in case one of them is only a secondary business for the farm.

The type of questions contained in this section refer to:

- final **farm surface** (taken from the previous section);
- **hatchery infrastructure;**
- **main and secondary infrastructure** for the **grow-out section** of the farm (including types of tanks for culture);
- type of **soils;**
- **distance to the coast;**
- **altitude;**
- soil **permeability;**
- **depth and type of bottom** (relevant in case of suspended culture systems);
- type of **water** used (seawater or freshwater), source and source flows (important in the case of farms drawing water from canals or rivers);
- **water intake systems** (in case the user selects 'pumps,' a menu appears on the type and characteristics of the pumps utilized);
- **water outlet** systems;
- **water treatment systems** for the hatchery and grow-out sections;
- total **volume and surfaces of tanks** in hatcheries and grow-out;
- **energy sources;**
- **available services** related to hatchery operation, veterinary problems, analysis (labs for water, soils, feeds, etc), feed production, transport, administration, processing, quarantine facilities.

Technology used for production

This is a very important section as it contains fields important for the comparison

with other existing projects. The information the programme requires from the user at this stage refers to the following topics:

- **expected production** for the first and second years, expected production for the third and fourth years and expected standard production (This information is extracted from the general identification section. A build-up of production is expected in most farms until a levelled production regime is reached.)
- **type of feed**
- **feed consumption** per year
- estimated **conversion factor in pre-fattening/nursery stages**
- estimated **conversion factor during grow-out;**
- total requirements for **seed**
- expected **mortalities** in commercial size
- expected **electricity consumption**
- expected **fuel consumption**
- expected **oxygen consumption**
- expected **manpower requirements,** both for permanent staff and for temporary staff
- expected **automatization of services** in the farm related to feeding, monitoring of physico-chemical parameters, selection and prophylaxis.

Main economic parameters

This section is extremely important at a later stage for the economic analysis of the proposed project. Many of the parameters introduced are elaborated and subsequently transferred to the section on financial analysis. The information initially required here refers to:

- **exchange rates** with the US dollar,
- **cost of land** by m^2, in local currency,
- total **investment,** in local currency,

As questions on operating cost, expressed in local currency and on annual cost basis, the following are included :

- **manpower cost** for management, experts, technicians, administration, workers,
- **rental** (for land or buildings),
- **seed**
- **feed**
- **electric energy**
- **fuel**
- **oxygen**
- **broodstock**
- **chemical products**
- **other consumable** products
- **spare parts**
- **miscellaneous**

A final group of economic data, to estimate the planned revenue, refers to the

expected prices as average per kg for the product and the percentage it represents vis-à-vis the total production according to the proposal. This group of data includes:

- **fresh**, in local currency
- fresh as % of total product
- **frozen**, in local currency
- frozen as % of total product
- **processed**, in local currency
- processed as % of total product
- **seed** as price per thousand, if the farm also sells seed

Simulation and comparison with projects in the DAE

Once the introduction of data of the new project proposal is finished, the user can start the comparison of his project and later its analysis. In order to initiate the comparison with existing projects, the user must first choose which projects contained in the Data Entry (DAE) to use. The programme offers three options. The first would be an automatic selection of the farms using the same type of production technology, species or group of species and commercial orientation. In the second option, the user can design its own filter with respect to the projects contained in the DAE according to his personal preferences. The third option is to eliminate all filters.

Once the filter has been selected, the APS extracts and calculates the data from the DAE, entering them in specific categories for the simulation. Some of the categories are indexes which have been selected as of potential interest for the evaluation of the proposals. The categories used by APS at present for the comparisons are the following:

- Total surface of the farm

  Important in the evaluation of trends, to be examined in respect of the coefficient of variation.

- Total volume of the farm

  Same criteria as above applies; important for farms using cages of for hatcheries

- Total surface covered

- Total investment in USD

  Expressed in USD in order to be able to compare investment in different countries of the region.

- Seed produced/culture volume

  Very important relationship for farms producing only seed, as it is generally an expression of the degree of technical proficiency.

- Maximum density in pre-fattening stages

Important parameter, as in project proposals it can alter the expected financial performance significantly.

- Maximum density in grow-out phase

  As above.

- Average conversion factor in pre-fattening

  Reference data for farms with grow-out or mixed operation. As feed represents usually an important component of operational costs, an alignment of this data with the existing farms may be an indication of a serious project proposal.

- Average conversion factor in grow-out

  As above. Very important, as even small changes in the expected values of this factor may alter significantly the financial performance of the farm

- Percentage of seed mortality.

  Indicates how much of the product is lost during the production cycle incorporating pre-fattening and grow-out. Also indicates the technological level in the management of the farm.

- Sale prices

  Useful mainly in stable market phases.

- Daily availability for water exchange

  Water availability may represent a limit to the production capacity of the farm, has a bearing in the cost of production and may be a limit to future expansion.

- Total production/daily availability for water exchange

  Indicative of the degree of technical efficiency of the farm.

- Total production/total surface

  Should not only refer to the water surface of the farm but should also take into account the space required for offices, roads, workshops, etc.

- Total production/annual consumption of electricity

  Indicated as weight of product per KW consumed.

- Total production/annual consumption of fuel

  As above.

- Total production/annual consumption of oxygen.

  Important for farms using intensive systems. Same criteria as above applies.

- Total production/combined consumption of energy(Kw + fuel + oxygen)

  Here the energy consumption is all converted to Kw. Important data, as

energy, may be one of the important cost elements of the farms.

- Total production/permanent staff
- Total production/temporary staff
- Total production/total staff
- Total investment/total production

The programme shows on the screen the various groups of data for each category and for the proposed project, and for the relative regional, country and geographic area. In each category used for the comparison, the programme provides four different values:

- maximum value amongst similar farms
- minimum value amongst similar farms
- average value amongst similar farms
- variation coefficient for the data extracted

On the basis of the comparison of the data of the proposed project with those of the DAE, the user can modify the design of the proposal to make it more in accordance with the results obtained by existing farms, using special functions.

Financial analysis

The financial analysis of the proposed project, which is an added capability of APS, requires additional data input by the user. It is done using constant values. The programme also retrieves information from the previous descriptionof the proposed project which have been entered by the user for the simulation. After these data have been entered, the programme automatically calculates and shows the results of the calculation in table form.

It must borne in mind that the APS Beta release is a first release and that further refinements of the financial analysis of the projects are envisaged as the SIPAM Network continues to operate. At this stage, as main features the programme includes the profit and losses account and estimates the overdraft requirements.

The data required by the programme for the financial analysis are grouped into several screens. The first group of data refers to financial information such as:

- exchange rate versus the US dollar
- contingency (in %)
- cash in hand (in %)
- starting date of production

In respect of contingency values, the user should introduce the average price variation expressed as percentage. The cash in hand refers to the percentage of the gross revenue needed for small expenditures.

The blocks of data that follow have a provision, in all of those related to payments, also for the permissible delays. The various screens include groups for:

- Labour cost

  The labour cost considers both permanent and temporary staff. This group of data is entered for the first three years, as it is possible that there be differences in the manpower requirements of the farm, depending on the construction and production expansion process.

- Technical assistance for operation

  The cost element of the technical assistance received by the farm refers to the cost of consultants employed to launch the production in the first three years or to resolve production management problems. It does not include the design costs.

- Cost of sales

  The costs of sales are given as a percentage of the total production revenue. These are the costs relative to packaging, distribution and commissions on sales.

- Subsidies and charges

  This section relates to the eventual receipt/payment of subsidies, taxes and dividends by the farm. Subsidies can be indicated either as investment percentage or as values. Taxes and dividends should be indicated as percentages. An element called exceptional charges has been introduced as a possibility for the user to test unexpected events in the production such as a crisis, and it helps to evaluate its impact in the financial results of the farm.

- Operating cost with the following components:
  electricity
  fuel
  oxygen
  feeds
  fry and broodstock
  sanitary chemicals
  other consumables
  spare parts
  advertising
  insurance
  communications
  travel expenses
  directors expenses
  audit expenses
  accountants fees
  rent for lands and buildings
  other miscellaneous costs

  In this section the values for the target production should be entered first (5th year). For the preceding four years the operational costs are expressed

as a percentage of the values corresponding to the target production.

- annual stock valuation
  %of stock at 31st December
  %of cost valuation
- working capital assets;
  · on sales (days)
  · as stocks, materials (days)
  · as stocks, live (days)

  These two groups give first the percentage values to calculate the amount of stock available at the end of the year and the eventual variations with respect to the unit costs. This valuation is of importance to all the farms which are involved with rearing cycles longer than 12 months.

- Investment costs, with the following components:
  land
  connection to services
  earthworks and ponds
  concrete and tanks
  buildings and masonry
  pumping station
  cages
  electrical equipment
  mechanical equipment
  other equipment
  vehicles
  boats
  other
  sundries

  This section covers the main investment costs of the farm, which should cover the first three years of the life of the farm from the start of the project. Some of the lines may not be real investment cost to the farm and should therefore be skipped. The programme requests also the indication of the residual value and VAT which are not calculated by APS in this first release. An indication of depreciation is required as it will give a clear idea of the future need to renew investments in the various lines.

- other costs:
  site surveillance
  studies
  consultancy cost
  legal costs
  miscellaneous costs

  This last section refers to initial cost of the project which are not amortized and will be completed in a single year.

After the cost sections, the programme deals with the revenues of the proposed project, differentiated for the first initial five years, which is considered the maximum to reach a target production. The programme requests the user to enter data for the various species cultured and price, quantity, percent of the product

which is sold in the various forms, weight loss in percentage and freezing loss, in percentage. These values provide the entire picture for the various products of the farm and what has been sold minus the weight losses due to processing. A fry production section is also included.

Once the detailed tables by species and for the various years are completed, the programme provides summary tables for product sales, for the various species put together and for the years analyzed. This is done automatically, except for the line 'other revenues', which represents activities other than production carried out by the farm and which result in some income (courses, consultancies, etc.). A summary table of the financial data of the farm is then produced by the programme, including:

- Financial items, years 1...3
  total investment
  operating costs
  total income
  subsidies
  rough difference

The last two screens refer to the farm relationship with the banks.

The first of these screen requests the information on the parameters imposed by the banks and to the needs for capital, possibilities for long term credit, and the share capital which should be provided (over a maximum of three years) by the share holders of the farm. The second screen specifies the conditions of up to three long-term loans (years of grace on capital, years of grace on interest, duration in years of the loan and % interest rate, with two types of reimbursement).

A line for the short term loans interest rate is also provided.

Once the financial data have been entered, the programme calculates and shows the results of the analysis in an automatic way, as a series of tables:

- Investments and Amortization
- Long-term Loans and Bank Overdrafts
- Revenues
- Selling Costs
- Variable Production Costs
- Fixed Production Costs
- Working Capital
- Profit and Loss Accounts, and
- Estimated Overdraft

The **Investments and Amortization** tables contain:

- the investment table as entered in the first phase, with in addition the values for replacement of investment (as indicated by the amortization plan entered by the user) which are entered automatically by the programme,
- the amortization tables for the first three years,
- the summary table for investments, with land excluded.

The programme contemplates a time horizon of twenty years with the investment costs distributed over the first three. The amortization table does not consider salvage/residual values.

The **Long-term Loans and Bank Overdraft** tables comprise three screens in which the annual reimbursements for capital and interest for loans are given. The first loan of the three contemplated has been calculated as a mortgage with a constant reimbursement rate. The second and third loans are calculated with a variable rate but with capital reimbursement constant. This type could be preferable to a mortgage in case the bank would allow an early cancellation of the loan.

The **Revenue** table is a summary of the tables dealing with sales. The various species produced are accounted for separately, while the eventual sale of fry is registered only as fry production.

The **Selling Costs** table provides the data entered in the first part of the financial analysis.

The **Variable Production Costs** table gives the costs of the farm, which vary according to the production levels and which therefore are output-dependent. For simplification purposes, the energy cost represents the sum of electricity and fuel while oxygen and chemicals stands for oxygen, sanitary products and chemicals.

The **Fixed Production Costs** table refers to those farm costs which do not vary with the increase or decrease in production and which therefore may be a large sum to be paid, regardless of the performance of the farm.

The **Working Capital** table provides the information on needs for circulating capital of the farm. It is given by the balance between current liabilities and current assets, which are composed by: the account receivable from product already sold, finished product which is ready to be sold, consumables (or the part of products required for production which are already available in the farm), cash in hand and the valuation of live stock, which excludes the finished product.

The **Profit and Loss Account** tables provide the balance between the revenues from sales and other commercial revenue, and all expenditures incurred, grouped by the categories that follow. In the tables, under direct production costs the programme includes all the cost elements which are involved directly in production such as packaging, the sum of variable costs, permanently employed staff, permanent employed labour and technical services. An element for exceptional charges is included to simulate the occurrence of a sudden loss in one of the first three years of operation, the most delicate, from a financial standpoint.

Stocks of materials indicates the consumables as included in the Working Capital table as well as the live fish stocks. The gross margin would be the algebraic sum of the revenues and the expenditures indicated above.

Other costs in this tables include depreciation as the sum of the amortization values, excluding land but including eventual contingencies for the first three years of the project life. General expenses is a broad category which includes items such as distribution, commissions on sales, repairs and spare parts, audit, accountancy

fees, insurance, advertising, travel, telecommunications, directors fees, rents, other cost and contingencies.

These last two groups (depreciation and general expenses), when subtracted from the gross margin, give the Profit Before Interest and Taxes, or PBIT. The gross profit (before taxes) is determined by the sum of the long term interest plus the interest on the estimated overdraft subtracted to the PBIT. Taxes are calculated only if there is a profit and not in case of losses.

Once this is completed, the programme determines the dividends, if applicable, in the **Distribution of Profit** tables. They are calculated as the product between the percentage of dividend anticipated and the profit after taxes. The retained earning would therefore be what is not distributed as dividends.

The **Estimated Overdraft**, the last set of tables in the financial analysis in this first release of APS, is an algebraic sum of several parameters which concur to provide an idea of the eventual need of the farm to request a bank overdraft.

These parameters start with the opening balance, which represent the previous-year value at the closure of accounts and whose sign follows the sign of those accounts.

The PBIT is the profit and losses balance before taxes, and again the sign of this parameter follows that of the closure of accounts of the present year.

Depreciation is intended as the value of the amortizations for the year being considered, with a changed sign, as, although the amortization is a cost in the balances, in order to determine the real cash needs, and, not being a real expenditure in the year, it is to be reintegrated with respect to the calculation of the PBIT.

The investment in fixed assets is intended as the sum of real investments for the year being considered, including the replacement (from the fourth year onwards) of materials subject to amortization. It goes with a negative sign as it represents a real expenditure for the farm.

Share capital derives from the initial inputs as the capital contributed by the owners for the implementation of the project.

Subsidies represent the capital subsidies received by the farm in the year being considered and carries a positive sign for the balance.

Long terms loans is the sum of the long term loans received by the farm for the year analyzed and carries also a positive sign as they are real inputs for the balance.

Change in working capital would be the cost in the current year for the difference in circulating capital and carries as sign the opposite of what it has in the profit and loss account.

Service of long-term loans refers to the cost to be incurred in the year under review for the reimbursement of interest and capital on long term loans. Being an expenditure, it carries a negative sign. Taxation for the previous year exercise also carries a negative sign.

Dividends carries a negative sign too and represents the payment of dividends for the previous-year operation.

Once these parameters have been added, the Estimated Overdraft is obtained and this, plus the interest due to such estimated overdraft, determines the total overdraft requirement for the current year.

THE FUTURE

The present release has been developed in MS-DOS environmental, to ensure the widest possible distribution and to integrate this with the SIPAM/SIPAL systems. It is foreseen, however, that a new version under Windows environment be released in the future.

The more pressing need for the immediate future appears to be the testing and evaluation of the APS by the countries participating in SIPAM and SIPAL and by specialist group such as those participating in SELAM.

Training of a sufficient number of interviewers to launch the surveys to fill the national DAEs of the programme is a pressing need for which resources still have to be found. Much would depend from the interest of the local administrations and banks to support the national SIPAM centres in this task. It is also obvious that a proper training of the persons in charge of the DAE should include means of provide assistance to the private sector. Farm operators may be interested in simulations of their own farms in order to verify which production parameters could still be improved to reach a good standard of operation or in a financial analysis of the performance of the farms. This side of the work in APS and SIPAM could be one of the income generating elements of the networks created by MEDRAP II.

Since an accurate DAE is essential for a proper functioning of the APS, it would be important to conduct awareness campaigns at country level, making emphasis on the strict confidentiality of the data provided by the various farms in order to encourage the participation of the entrepreneurs in this project. The initial tests carried out in Italy demonstrate that such cooperation is possible, and the data from Mexico, where the APS is being already tested, confirms that it is possible to obtain technical and economic information from the various farms. It is easy for an entrepreneur to understand the benefit which could be derived from such a system for tuning of his own enterprise in a world of increasing competitiveness.

Given the fact that other aquaculture information systems such as AQUABANK exist or could be created, it would be of mutual interest to be able to create interfaces to exchange data between systems.

Depending on the interest expressed by the banking sector in the participating countries, it should also be possible to increase the level of complexity of the financial analysis carried out by APS. As previously indicated, this first version of

the APS is a beta release and, therefore, cannot be considered as the final product. The financial analysis included could be expanded to calculate additional parameters such as internal rates of return or to perform a sensitivity analysis.

In the longer term, and depending from the development of the other data banks in SIPAM, it should be possible to create the interfaces to load automatically the data necessary for the comparison of technical and financial parameters of the proposed projects.

The SELAM group is invited to participate in the development of this analytical tool by providing comments on the present version, participate in the evolution of the system, for which a specific group could be organized if so desired, and to divulge the APS.