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**Collaborative program on the  
promotion of the AFJM concept in  
Hadejia Valley Irrigation Project  
(HVIP) in Nigeria**

**Trip report 29/01/2002 to 08/02/2002**

Marc Despinoy  
Mars 2002  
CIRAD/AMIS N° 16  
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## Table of contents

1. Introduction.....	4
1.1. The Hadejia Valley Irrigation Project .....	4
1.2. Objectives of the mission.....	5
2. Information System (IS).....	5
2.1. The objectives .....	5
2.2. The concept.....	6
3. Programme activities .....	6
3.1. Data base or IS .....	6
3.2. Geographical information system .....	13
4. Conclusions.....	15
Annex 1 : Trip Schedule.....	17
Annex 2 : technical points observed during the seminars (Notes) .....	17
Annex 3 : Rectas training summary and mission plan (previous version) .....	25
Annex 4 : Automatic IS Interface Creation proposition.....	27

## Abbreviations

GIS-----Geographic Information System  
HJRBDA-----Hadejia Jama'are River Basin Development Authority, Kano  
HVIP-----Hadejia Valley Irrigation Project, Hadejia  
IS-----Information System  
KRIP-----  
NAERLS-----National Agricultural Extension and Research Liaison Service, Zaria  
RECTAS-----Regional Center for Training in Aerospace Surveys (Ife University)  
WUA-----Water Users Association

## **1. Introduction**

### **1.1. The Hadejia Valley Irrigation Project**

The Hadejia Valley Irrigation Project is the second largest irrigation scheme under the responsibility of the Hadejia Jama'are River Basin Authority (HJRBDA). A total of 12.500 ha are planned under this scheme, but so far only 2.150 ha have been developed. In addition, farmers are growing an estimated 1.000 ha of irrigated crops outside of the command area, by taking water directly from the main canal of the project.

A number of problems related to irrigated agriculture in the Hadejia Valley Irrigation Project have determined the formulation of a collaborative intervention by the National Agricultural Extension and Research Liaison Service, Zaria and CIRAD to promote farmers' participation in irrigation system management by developing and strengthening Water Users Associations (WUA) and by supporting the reorientation of the management of the agency (Hadejia Valley Irrigation Project – HVIP agency). This agency is under the responsibility of HJRBDA, which is one of the partners of the collaborative programme. HVIP is seen as a case study, which results should be applicable to other irrigation schemes of the authority.

The major concern of the project management relates to the low cropping intensities in the dry season (November to May). Farmers in some of the areas out of command are using the water canal to grow dry season crops with remarkable diligence. The example of the Gatafa village was given by the project staff.

The federal government requires farmers to take part in the operation and maintenance of their irrigation schemes as a cost-sharing strategy. In the HVIP project, farmers are making a considerable contribution to system's maintenance.

Meanwhile, HVIP does not have an adequate budget to carry out the maintenance activities for the main canal, the collector drains and the main drain. Accordingly some problems were observed (weak spot, siltation, lake of lubrication, barrage erosion...). However, the main issue in terms of maintenance is apparently the drainage system.

The farmer's projects are new to irrigated agriculture and lack certain skills for planning and executing vital activities such as procuring inputs, scheduling of their crop production, operation as well as maintenance of the irrigation and drainage network, resource mobilisation, marketing... The collaborative programme made significant contributions in addressing these issues through different training activities targeted towards the Water Users' Organisations (WUA) or the WUA facilitators of the agency.

The importance of farmers participation in irrigation management has been recognised at a political level through an Irrigation Decree. The experiences obtained through the collaborative programme at HVIP have contributed to the discussions at policy level that have led to this decree.

An Information System (IS), ACCESS database and MapInfo GIS, has been developed and a seasonal performance report has been produced by the agency, using this information system. The low cropping ratios in the dry season have thus been quantified and the scheme management now considers this as a key issue.

The irrigation agency staff and farmers have been involved in a number of training sessions on operation and maintenance, crop production, post-harvest handling, marketing, etc. A positive point is the transfer of the IS to the agency staff. Four trainees have acquired the capacity of using the IS.

## 1.2. Objectives of the mission

The objectives of the mission were as followed :

- Review the uses and needs of the IS for decision support in irrigation management in the case of HVIP and KRIP,
- Review the uses and needs for spatial analysis and database management in NAERLS,
- Define and plan the requirements for the development of the software in order to answer to the needs,
- Define and plan data collection requirements to be able to carry out spatial analyses,
- Analyse the issue of interfacing the database and GIS software.

During the mission, these points were treated through seminar and technical sessions in different places (cf. trip schedule in Annex 1).

## 2. Information System (IS)

### 2.1. The objectives

The HVIP information system consists of a database, developed on ACCESS platform, linked with a GIS software (MapInfo) to visualise the spatial patterns of crop production, operations and maintenance. The links between the database and the GIS are not automated actually.

The HVIP information system was mainly designed to support :

- the seasonal monitoring and evaluation of the performance of the irrigation system and the scheme's farmers,
- the decision making in the maintenance of the irrigation and drainage network,
- the analysis of irrigation-related issues in agriculture,
- decision related to irrigation systems at a policy level.

The agency proposed to include a marketing module in the IS, related mainly to prices of inputs and commodities on nearby markets. Farmers expressed their concern over the difficulty in planning their activities for efficient marketing. Before the inception of the irrigation system, mainly staple crops were grown (millet, sorghum) and farmers had to integrate a market perception. It appeared they succeeded with rice, but faced difficulties in other crops, especially vegetables due to the volatility in prices and the perishable nature of the produce. However, it appears to be viable opportunities. Over the past Farmers have been quite late in producing dry season crops, their harvest coinciding with that of the much larger KRIP project (over 10.000 ha cultivated in the dry season). However due to climatic reasons HVIP farmers could produce their crops earlier than KRIP farmers, thus making a better deal. This clearly

offers a scope for HVIP farmers for a better cropping and marketing strategy during the dry season.

## 2.2. The concept

For a conceptual point of view, this IS was developed to generate information which can be exploited in a GIS software. Therefore two aspects have been raised i) database structure and ii) spatialisation of the generated information.

The IS software was developed under the MERISE methodology. This concept is mainly based on the dynamic interactions between the data base elements. It was created for hierarchical data base management, and lot of relational data base. Managing system software and computer language (FoxPro, ACCESS, Paradox, dBase, SQL...) have integrated this concept. This french technique of analyse appeared in 1972 thanks to searches as Moulin, Tardieu and Teboul. Few years later, MERISE extended it to the world scientific domain by Peter Chen ("The Entity Relationship Model")<sup>1</sup>.

The main advantage of this method is to properly (=correctement) formalize a case study with rigorous analyse. Nowadays, other analyse procedures are developed which are lighter, in term of actions steps, as the oriented object methods (UML...). (= pendant ce temps) However, MERISE is, without contest, the most used methodology in data base conceptualisation.

## 3. Programme activities

### 3.1. Data base or IS

In Mr. Chaussonot's study report, a methodology describes seven steps which are, as far as I'm concerned, well followed during his study. Unfortunately, due to a lack of time, Mr. Chaussonot couldn't give a cleaned version of the IS. This interferes in the comprehension of the structure of the database and IS' users couldn't maintenance it (add interfaces...) and adapt it to a new case of irrigation management project (KRIP for ex.). So the first step is to review the data base structure of the IS in order to, on the first hand, understand the relationship between table and, on the second hand, improve IS users knowledge's on the data base structure.

The following principal remarks are coming from analyses of the situation regards to trainees knowledge on the IS. On the first hand, brainstorming with the trainees rise up the needs and problems encountered by the users. We have worked together to analyse the situation and fixe some solutions.

### *Methodology of analyse description procedure (1 session)*

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<sup>1</sup> ACM, Transaction on Database System, 1976



The problems were essentially focused on technical/software problems. I decided to make an oral report during the meeting. This report should help to define an action plan.

We had to step backwards in order to analyse the project on its totality. This is useful to focus the thinking on the difficulties and problems.

For example, relationship between tables in ACCESS software should already analyse and should cause no problem. So I proposed to start and simulate a new methodology of project analysis which can be resumed through these following points :

- Turn off the computer,
- Analyse the objectives of the project (brainstorming if you want),
- Found the possible steps to reach the objectives,
- For each steps, write down the possible data (field data) you need and their links between them. Generally, a link is a parameter as name or identifier,
- Give a name for each data which will be the name of the associated tables,
- Turn on your computer... and create a table in ACCESS. The key which links the tables together will be the parameter describe before.

At the data collection step, the collection forms definition should be well defined regard to the needs. This could be done with a good analyse of the aims of the project. This is very important in order to link collected data to the farmers and their fields. Geographical position, for example, can sometimes bring important informations.

#### *Development of interface (ex. of STO discharge calculation) (1/2 session)*

HVIP seminarists wanted to integrate a new interface to the IS in the water management operation. This is to solve the calculation of discharge for each sector at a specific date.

In other terms, they want to include new option in the "Water Management Operation" menu called "Operation at STO" which calculates on Access software the discharge at STO with the following formula :

$$Q = C_w * W.Y * \sqrt{2g(H - \mu.Y)} * NumGatesopened$$

with :

Q : Flow in Cu

C<sub>w</sub> : Coefficient of discharge (assimilated to a constant = ?)

μ.Y : Vertical coefficient, calculated by the user in function of the Y/H ratio

Y : Vertical opening of the gate (m)

g : constant = ?

H : Upstream head

UY : Vertical coefficient

And with :

For value of U (already calculated by hand)

Y/H	0,1	0,2	0,3	0,4	0,5	0,6
$\mu$	0,61	0,62	0,63	0,65	0,68	0,72

Remark : Bold characters are variables

This new menu was added to the IS software :

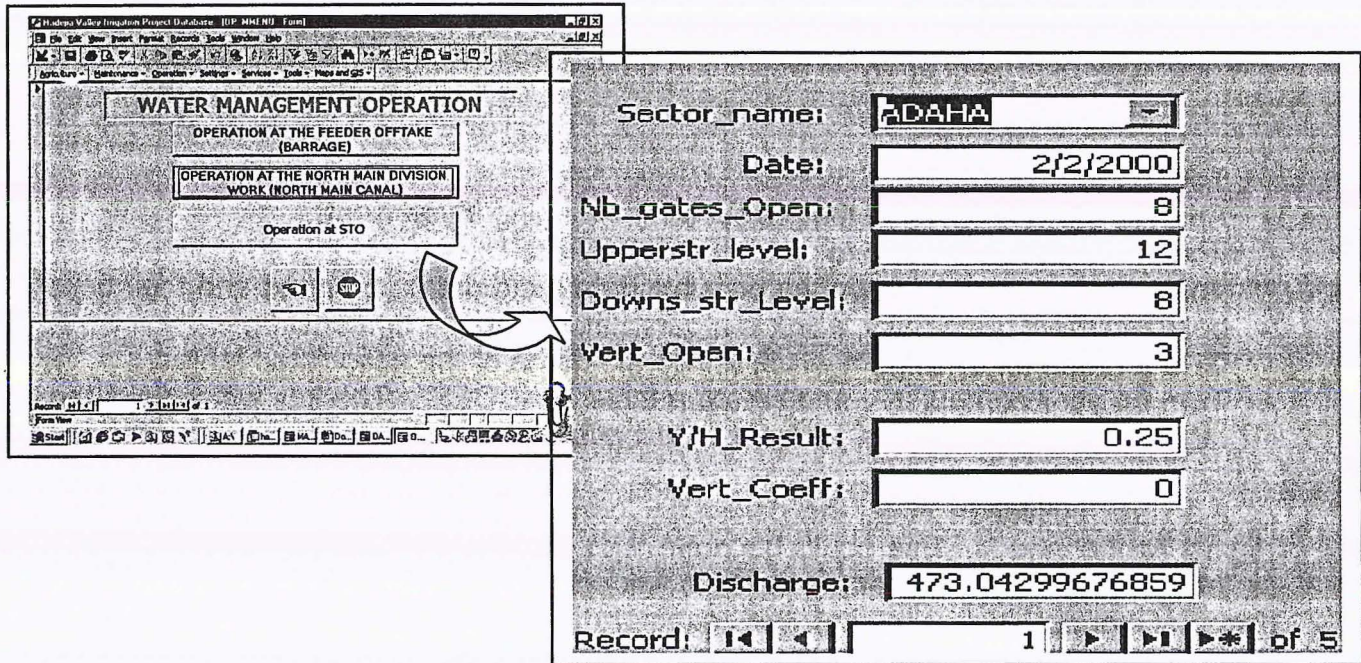


Figure 1 : STO discharge menu/entry form

### Variant

In this version of STO discharge calculation, the user has to enter Cw, Y, H, number of gate opened, calculate the vertical coefficient (U.Y) and enter it in the right field. As  $\mu$  is a function of Y, and the value of the Y/H ratio is known, the value of  $\mu$  could be automatically calculated by ACCESS software.

*KRIP project (field data structure to collect, needs analysis, tables relationship...)  
(2 sessions)*

### Data analysis

After a brainstorming on the data base collection problem, the following remarks were found :

- There is a need to determine the objectives of the Information System as a previous step of the IS development.
- It is necessary to look closer to the proposed data to collect, the proper IS to develop seems to be more a database than a Geographical IS. Indeed, a GIS requires mainly quantitative spatial informations, which are actually very few in the proposed data to be collected.

- Different levels of information collection and dissemination are meant :
  1. At the local level : local markets, local varieties grown, yields under specific conditions...
  2. At the state level : production by state, land areas per state...
  3. At the national and international level : export and import constraints, quantities, expenditures...

➤ This shows the very need to determine who is going to be the stakeholder involved in the collection and the ones to take benefit from this information. This is a necessary condition before designing the Information System.

According to the previous step, the following table 1 was proposed by the seminarist. It shows a classification of different data on the basis of their nature (qualitative/quantitative, spatial/non spatial)

**Table 1 : Classification of the data**

	<b>Qualitative data</b>	<b>Quantitative data</b>
<b>Spatial Data</b>	1- In which states is it grown? 2- What are the local varieties grown? 3- Locations where each variety has been released 4- <i>Factors that affect dissemination of each improved variety<sup>2</sup></i> 5- <i>Other improved varieties available to farmers</i> 6- <i>Sources of these improved varieties</i> 7- <i>Varieties grown by farmers</i> 8- Major local markets of the crop	9- Land area devoted to the crop in each state - Land area devoted to the crop by state ( <b>same question?</b> ) 10- <i>Yield of local varieties from farmers field</i> 11- <i>Yield of improved varieties from farmers field</i> 12- Output of the crop by state and by year - National production by state and by year ( <b>same question?</b> )
<b>Non Spatial Data</b>	13- ARI that has mandate on the crop 14- Varieties released by the NARI 15- Year of release of each variety 16- Production requirements of each variety 17- Problems encountered by farmers in growing the crop 18- Domestic marketing constraints 19- Export marketing constraints 20- Domestic processing constraints	21- Yield potential of each variety 22- Rate adoption of improved varieties 23- Quantity exported by year 24- Exported to which countries 25- Total revenue from export 26- Quantity imported 27- Imported from which countries 28- Expenditure on import by year 29- Export potentials 30- Domestic processing potential

<sup>2</sup> In italic font, the data are not by nature spatial data, but can be linked with their spatial source (i.e. where they have been collected)

- a) Target of the database
  1. Policy makers
  2. Private sector
  3. Farmers through ADP and mass medias
- b) Methodology proposed by NAERLS
  1. Identify crops
  2. Data collection form
  3. Assign responsibility
- c) Sources of information
  1. Cropping season evaluation (yearly)
  2. Specific information collection through questionnaires
  3. Training with ADPs

By using table 1, we have done a distribution of each points (1 to 30) at the 3 levels of information (International, National and State) and in the 5 principal axes of the project which are :

- Input sources,
- Production,
- Processing / Storage,
- Marketing,
- Research.

To illustrate the analysis procedure, an example was given on Maize only. Of course these steps should be done for every varieties.

**Table 2 : Data collection form**

Example for	Input sources	Production	Processing / storage	Marketing	Research
Maize					
International				19, 24, 27, 29	
National	6	16, 31	20, 30	18, 19, 23, 24, 25, 26, 28, 29	4, 5, 6, 13, 14, 15, 16, 21, 22
State	6	1, 2, 7, 9, 10, 11, 12, 17	20, 30	8, 18	3, 4

Macro-economic aggregate are they really relevant ?  
How to disseminate information ?

To reduce data collection, we have proceeded to an useless/redundant information elimination. This reduced table 2 to only 3 principal axes which are i) production, ii) marketing and iii) research.

For example, point 6 (Sources of the improved varieties) can be retrieved in the "production" axe through points 1, 2 and 7.

Afterwards, we looked for the relevant information, at the production level, and their parameters for each data. These informations and parameters should be the ACCESS tables which constructed the IS data base. For example we will have one table called "Climate" with the following parameters : rainfall, temperature, relative humidity and ETP.

**Table 3 : Example of relevant data on production division over maize**

<b>Data to collect</b>	<b>Relevant information (parameters)</b>
1. Requirements for varieties	<b>Climate</b> (Rainfall, temperature, relative humidity, ETP), <b>Land</b> (soil type, texture, Ph of soil, type of fertilisers, rate of fertilisers application, time of application, method of application), <b>Chemical</b> (type of chemical, time of application, method of applications), <b>Labour</b> (labour type), <b>Land preparation</b> (clearing, plough, arrow, ridging/flat time of preparation, method of preparation) <b>Planting</b> (type of method, spacing/seed rate/plant population, time of planting, depth) <b>Weed management</b> (weeding type, pesticides, time of weeding, number, method of weed control) <b>Pest management</b> (type, method of control) <b>Disease management</b> (type, method of control) <b>Harvesting</b> (method of cutting, time of cutting)
Sources of improved variety	
In which state is it grown	
Local varieties grown/area	
2. Varieties grown by farmers / Area / State	<b>Indigenous/Improved variety</b> (name, colour, duration, average yield, area cropped/state) <b>State</b> (name)
Land area/state	
Yield of local / varieties / State	
Yield of improved varieties	
Output state	
3. Input sources/price	<b>Input source</b> (Type, source, price, availability)
4. Problems encountered by farmers / State	<b>Problems</b> (type, period, location, severity, solution)

After this exercise, tables were drawn on a sheet and the links between them were found. Through this step the principle key parameter would be found for each table. This step has been done.

## Summary of the Analysis followed process :

**Classification of the different data on the basis of their nature (qualitative, quantitative, spatial/non spatial)**

1. Choose example of commodity representative
2. Identify level of information and kind of data
3. Create table and found questions of qualitative and quantitative data (sheet question already done for example)
4. Try to define groups of data (circles) => has to be named !
5. Analyse data (redundant information...)
6. For each group, group data by interest order
7. Care about level data. Should we need the same information for each level (international, national and state) ?
8. For each information, list all the parameters (will be the structure of table)
9. Is the Data priority relevant ?
10. Try to identify the main table into Data
11. Try to see links between tables (verify if all the information is taken into account) and draw them. Some modifications will appear (new tables, modify tables...)
12. Try to identify the table which links all the data (this main table will be, for this example, **crops** (Id, name))

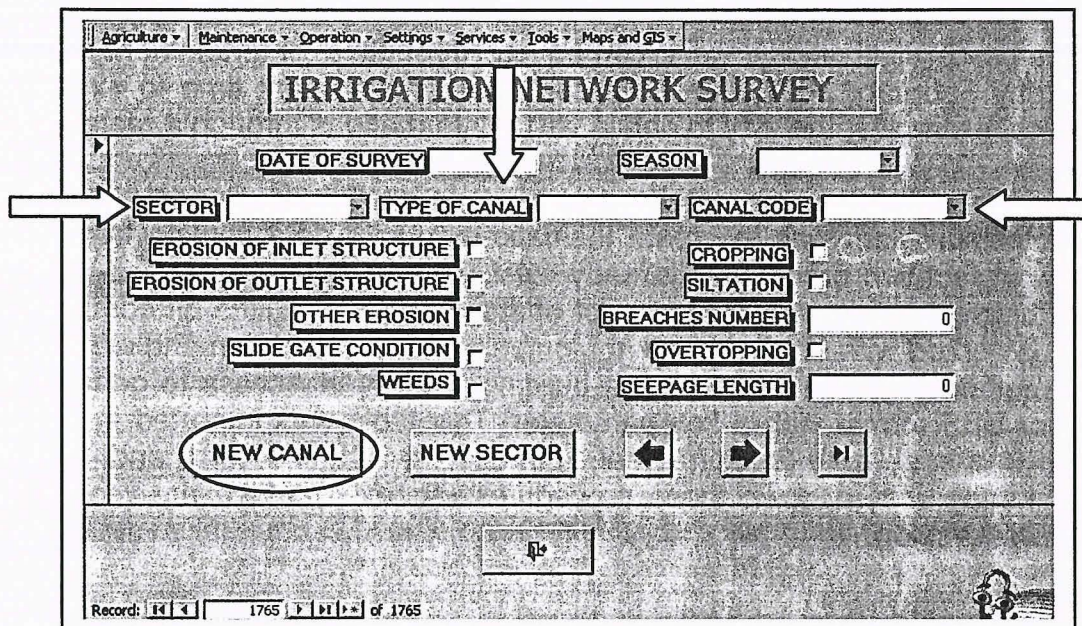
**Information System**

As they have already some informations collected, they just have to compare them to the results of this methodology (enter the information through a form) and try to get the other informations (collection data form).

### *Other remarks*

- Problem of message error generated when a button "new canal" on the menu was seen.

It appears that the form developed need some values as key code and other values referring to key code (yellow arrows). This is a problem of error message control. Maybe Mr. Chaussenot had not enough time to go through a control procedure in order to manage the errors. So, this should appeared at all levels in the interfaces (forms) of the IS. I think that trainees have the knowledge to solve this problem.



- On the marketing module

Question : You will have several commodities for several market but for only one date ?

Solution : Date is definitely the control field. But it is not sufficient. We have to put another key on the commoditiesprice table : market.

### 3.2. Geographical information system

#### *Technical session on digitization on screen (2 sessions)*

I worked principally on 3 problems (MapInfo workspace file, Interface between MapInfo and ACCESS, Problems of version of Mapinfo version) because they were linked. In fact, when a query is done on the Access software, it should generate a report file in an importable format for MapInfo software (TXT, DBF, XLS). This does not appear in the IS software and should be created. Otherwise, all the procedure to build thematic map with the imported data was written down on a report which exists on the install CD-Rom IS software. The problem is that this procedure is long and can confuse people a bit. But this procedure works !

As I had not enough time to develop an interface to simplify the procedure, I proposed that this procedure should be followed. I assisted trainees during a technical session to explain in detail this procedure.

Somehow, Mr. Balmisse had already done a technical session on this problem.

As Mr. Chaussonot used a 5.5 version of MapInfo to generate the workspaces, so an equal or higher version has to be used.

### *ACCESS and MapInfo interface (1 session)*

Problems of digitization were carried out through a entertainment session (2<sup>nd</sup>, Saturday February 2002). Mr. Balmisse and I have spent time to explain through practical examples, the way to obtain vector informations through a raster digitization.

Again, the digitization on raster map was done on the 3<sup>rd</sup>, Sunday February 2002. The other problem was to create thematic map with data coming from an Access query. In fact two procedures already exist. The first one was already described in Mr. Chaussenot' manual. There is lot of steps and it is a little bit complicated. Last year, I worked with Mr. Balmisse at Montpellier on this problem and we developped a new methodology. This consists on building a query in Access to generate table in XLS or DBF format with a key parameter. This table was imported in MapInfo and linked to a base map (sector, canal...) through a SQL line command. Mr. Balmisse has already written down these procedures (annex 4) which are repeated at this technical session.



#### 4. Conclusions

During this seminar, many technical and conceptual problems were encountered and solved. Over these few days I saw most part of the major problems and understood the objectives. Some remarks ensued from my observations.

On the first hand, it is evident that data base of the Information System (IS) was not properly finished (tables redundancies...). So, a particular effort needs to be taken to analyse and document the database of the IS. This should solve problems of :

- Useless tables,
- Links between tables,
- Introduction of future modules in the IS,
- Data collection instrument (marketing module) in order to get the right data.

On a second hand, I would like to focus on a particular point : Interface between MapInfo and ACCESS. This is already solved and two solutions exist. The first one has been developed by Mr. Chaussenot and has been described in his report. The second one is described by Mr. Mr. Balmisse.

As far as I'm concerned, the only problem existing at this level is only a problem of data integration coming from Access into a map layer in MapInfo. This step needs :

- a query on Access to generate data with a **key field**,
- run an SQL line command to join the information to a base map already georeferenced.

These two steps were discussed twice with Mr. Balmisse.

Otherwise, some minor technical problems were solved as :

- MapInfo workspace file which is relative to the next problem,
- Problems of version of MapInfo version,
- Discharge STO calculation on ACCESS,
- Creation of queries,
- In the marketing module, the report show all the data of the database,
- In the marketing module, repetition of data in the entry is possible,
- Message error for "New canal" button in the operation/ menu,
- Georeferenced raster layer and vectorisation on this layer in MapInfo.

#### Other remarks :

For minor technical problem, please refer to annex 2.

During a meeting with farmers, they express their problem of the cost of merchandise transportation. I've proposed that a map of different cost zones/limits could be done on GIS software as MapInfo which take into account the parameters of distance and costs (car, petrol, product cost, market cost...).

Globally, a good implication of the actors in this project is visible. This is coming from the good technical level and dynamic people.

Despite of the lack of training on MapInfo software, trainees understand the major part of the GIS concept tool and they well assimilated the software commands too. So, an extra training on GIS software should be unnecessary. Then, for a question of homogeneous data and software, MapInfo and ACCESS have to be kept as the reference software.

## ANNEX 1 : TRIP SCHEDULE

	30/01	31/01	01/02	02/02	03/02	04/02	05/02	06/02	07/02
Kano									
Hadejia									
Zaria									
Abuja									

Kano : KRIP Project

Hadejia : HVIP Irrigation project

Zaria : NAERLS Project

Abuja : French Embassy and RECTAS visit

## ANNEX 2 : TECHNICAL POINTS OBSERVED DURING THE SEMINARS (NOTES)

### 30<sup>th</sup> Wednesday, January 2002 (Kano)

Planning meeting with KRIP management.

Presentation journey of KRIP and NAERLS projects and training seminaries.

#### Ajingi (KRIP)

The aim is to enter ground collected data on the IS (Information System) and build maps. Presentation of specific modules on Access software.

Observations of participants :

- No maps,
- Ground collected data exist and have served to build tables on Access,
- Menus creation for enter data (hierarchical structure),
- Visualisation and print interface already exist,

Problems listed :

- Queries creation,
- Macro-modules, creation,
- Relationships between tables.

#### Liman (KRIP)

Presentation of MapInfo works.

The objective is to build a vector layer over cultivated sectors. Digitisation has already done in Rectas through autocad software without georeferenced system.

Problems identified :

- Lack of georeferenced system,
- Maps edition,
- Various scale in the IS,

- Polyline digitisation instead of polygons.

Conclusion sentence : « Define more precisely the requirements of the project ».

### **Kura (KRIP)**

Discussion on IS perception and problem in general terms. Few remarks has been done on farmers :

- Maintenance problems on the fields (pumps, sand...) : logistic
- They want a water supply of their parcels,
- Need backup.

The creation of farmers association allow to manage best part of these problems.

Farmers remarks and questions:

- They find a good repercussions of the project at farmer level,
- Question of cost control of market garden produces (cost gap should be important between two markets)
- Does the IS could increase their production ?
- Does the cost information will be spread between farmers ? and how ?
- What is the contribution of this project at market level ?

### **Jibrin (NAERLS)**

- RECTAS training oral report,
- Results of a socio-economic analysis of farmers in HVIP project, report and his IS incorporation,
- Marketing module creation necessity in the HVIP project.

In conclusion RECTAS training was good and they ask to have another similar training. They ask to use ILWIS 3.0 GIS software.

### **PM**

KRIP project site visit (rice fields) :

- salty land problems coming form water pollution (villager clean their clothes in the irrigation canals),
- no estimation of the problem extent has been done yet,
- PM remarks that over a long period of time (20 years) this phenomena be incline to decrease (see to stop) due to presence of organic matter in soil.

This last remark is very important because it is a hard critic for the salinisation KRIP project.

## **31st, Thursday January 2002 (Kano)**

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Technical session with KRIP RECTAS trainees

- Data collection forms definition
- Detailed review of the developed IS
- Technical advises on solutions to problems identified during the seminar
- Final meeting with all Rectas training and IS module

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### **Problems on Map edition**

Solved problems :

- Screen digitization,
- Georeferenced data (raster),
- Information (get the coordinates of each polygons and polyline...),

Problem non solved :

- Link between database and MapInfo

I propose that this problem will be exposed and solved at Hadejia.

### **Conclusion :**

- You have to keep same software during your work. This is to have homogenous data and eliminate problems of data format (Autocad and MapInfo for example),
- Take care of the collected field terrain form,
- Don't hesitate to step backwards in order to have a global view of the project and problems. This is useful to do an good analyse in order to win time.

## 1<sup>st</sup> Friday February 2002 (Kano -> Hadejia)

Trip to Hadejia camp.

Seminar by HVIP trainees :

- presentation of the HVIP Information System
- presentation of the latest IS development
- application to water management by the agency and the WUA

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A lack of electricity has forced us to introduce directly the third point which was the application to water management by the agency and the WUA.

Problem with the definition of the session. WUA and people of the project expect to me to have some questions on their new module of "marketing" and attempt to focus on necessary parameters.

=> "brainstorming" on the IS database and some trainees explain to me roughly the principle of the software.

A table describes the IS and relationship between table has already done by Mr. Balmisse B. (Structure definitive.ppt)

Electricity coming...

Two presentation was done (Halai and Imrans) on technical aspect of the IS (global presentation). These were useful to focus on their technical problems on the manipulation of database (ACCESS software) :

- MapInfo workspace file
- Interface between MapInfo and ACCESS
- Problems of version of Mapinfo version
- Discharge STO calculation on ACCESS
- Data collection instrument (marketing module) in order to get the right data
- In the marketing module, the report show all the data of the database
- In the marketing module, repetition of data in the entry is possible
- Problems of integration the marketing module in the IS database
- See the structure of the database
- Message error for "New canal" button in the operation/ menu.

## **2<sup>nd</sup>, Saturday February 2002 (Hadejia)**

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Mapping field exercises with WUA

- on the results of the WS (water system ?) crop survey,
- and/or on the results of the network survey,
- and/or on the results of the digitization.

Restitution exercise with HVIP management review of the needs for IS development to support decision making in water management

Site visit : meeting with farmers. Discussion on problem of cultivation, tomatoes transportation and how to get price market easily.

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The day was used to discuss on all the technical problems the trainees encountered in the use of MapInfo and Access.

Problems of digitization was carried out through a entertainment session. Mr. Balmisse and me have spent time to explain through practical examples the way to obtain vector information through a raster digitization.

## **3<sup>rd</sup> Sunday February 2002 (Hadejia)**

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Discussion on several points non covered during precedent sessions.

Again, the digitization on raster map was done. The other problem was to create thematic map with data coming from an Access query => two procedures already exist to solve this problem :

- first one was already describe in the Mr. Chaussenot' manual : lot of steps
- second one, new methodology developed with Sebastian.

Discussion on the problem of message error which appears on the "irrigation network survey" interface.

Site visit : Ngura, wetland of Dagona water flow sanctuary.

## **4<sup>th</sup> Monday February 2002 (Hadejia -> Zaria)**

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KRIP seminar closure seance. Restitution of the different comments on problem and summarised solutions.

Trip to Zaria

## **5<sup>th</sup> Tuesday February 2002 (Zaria)**

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NAERLS Data base Databank

Technical session on databank development,

Presentation of solution for MapInfo/ACCESS interface development.

1. Why do they use this databank

Federal demand, national mandate

Need for information gathering

Agriculture, diff crop, diff. areas

Diff. Kind of Information :

- Commodities (diff. Crop from diff country) : 49 to be extended
- Marketing
- Processing
- Extension activities
- Extension research

Which information is relevant ?

At which scale can they start ? Research institute and farmers level.

What is the using of this IS ?

Idea of data collection process ?

**Data project analyse**



## 6<sup>th</sup> Wednesday January 2002 (Zaria -> Abuja)

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AM :

1. Questions about yesterday brainstorming,
  2. Technical problem on Access problems (marketing data entry : repetition)
  3. Technical session on on-screen digitisation (explain the Mr. Balmisse's methodology),
  4. Data collection format
  5. Visit the NAERLS library data base existing,
- Wrap up meeting.

PM : Trip to Abuja

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1. No question
4. Data collection format should built on the data base analysis. Analyse created tables will be the best direction. Each parameters in tables raise at least 1 question.
5. No problems
3. Mr. Balmisse
2. Solved it with Jebrin

Observations and recommendations :

1. You have to keep same software during your work. This is to have homogenous data and eliminate problems of data format (Autocad and MapInfo for example),
2. Take care of the collected field terrain form,
3. Don't hesitate to step backwards in order to have a global view of the project and problems. This is useful to do an good analyse in order to win time.

**Wrap up : define action plan**

HVIP	NAERLS	KRIP
* IS and AFJM * digitization of tail end sector (editing) * marketing module (updating) STO operation	* initiate action on databank devt * define requirements for establishing of IS * staff training on IS * intervention on library IS	* database project analysis * creation of database * digitization of sectors * data entry/collection

## **7<sup>th</sup> Thursday January 2002 (Abuja-> Lagos -> Ife)**

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AM : Trip to Lagos (plane)

Discussion with Guy Christophe (French Embassy)

PM : Trip to Ile Ife (car)

Trip to Ile Ife :

Rectas visit in order to make an evaluation of their knowledge and their materials (computers, software...).

Few points discussed with Guy Christophe :

- Is it possible to combine Okomu Cie and Rectas ? Possibility of training people from rectas in "maison de la télédétection". Payment should be found by Guy Christophe. This could be a collaboration between MTD and RECTAS...
- Send some references book on GIS and RS to Orah Azuka at [rectas@oauife.edu.ng](mailto:rectas@oauife.edu.ng)
- See with Mr. Balmisse if he can send me his report on FDALR => They have the complete cover of Nigeria by SPOT Imagery (1995, 1996). Interesting.

## **8<sup>th</sup> Friday January 2002 (Ife -> Lagos)**

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Trip to Lagos (car)

Trip to Okomu (car) camp

## **ANNEX 3 : RECTAS TRAINING SUMMARY AND MISSION PLAN (PREVIOUS VERSION)**

### **Information System: Evaluation of the RECTAS training impact**

An eight weeks training was carried out at the Regional Centre for Training in Aerospace Survey (Rectas) for six staffs of the collaborative: four members of HJRBDA Staff (respectively two from HVIP and two from KRIP) and two staffs of the NAERLS. The purpose of this training was to acquire skills in Information System (IS) and Database management, in order to develop and apply these tools to support management, research and/or decision-making in the involved organisms.

One of the objectives of this mission was to evaluate the achievements of the training and to plan for further activities in order to concretise the impact of this training.

Three meetings were held, with respectively each of the three groups of HVIP, KRIP, and NAERLS, to evaluate the achievements and encountered difficulties and the further activities to carry out.

### **Achievements and shortcomings**

The table 2 presents the achievements for every institute and agency involved in the training as well as the obstacles and difficulties encountered.

**Table 1- Achievements, constraints and further developments of IS**

	<b>NAERLS</b>	<b>HVIP</b>	<b>KRIP</b>
<b>Achievements</b>	Development of the Marketing module: Conceptual inventory of information Formalization entity association Conception of the module Conception of data collection formats		Digitization and georeferencing of one sector
	Work on baseline survey data: crossed data analysis, and attempt to import the data in the HVIP IS.	Development of STO Gate discharge module	Creation of a database Inventory of available information
	Sensitization with IS applications opportunities in NAERLS	Digitization of Yamidi sector	Conceptual inventory of information Formalization entity association Conception of the modules Data entry
<b>Constraints</b>	Baseline survey: the data are inadequate to use them in a spatial analysis (sample size too small at sector level, high standard deviations)	Some more information were lacking to create the Crop Water Requirement module	Better maps, with geographic references are needed to digitize the sectors
	The marketing module could not be completely finalized because of time constraints	The digitization of the sectors was hampered by the lack of clear understanding of field name and boundaries	More training is needed on queries use and thematic mapping creation A link (interface) has to be created between ACCESS and Mapinfo
	More training in ACCESS and Mapinfo use is required		
	Generally, a lack of available staff and prepared training was felt, particularly in the four last weeks of the training		
<b>Focus of further development and applications</b>	Integration of IS and AFJM concept Application of IS in other research fields	Restitution by mapping exercises with WUAs	Sensitization and mobilization of the KRIP management Development of the IS

### Action plan

The analysis of the held meetings could allow the mission team to draw together with the trainees an action plan. Initially, a mission of a French technical expert in IS, Marc Despinoy from CIRAD, was to take place from the 22<sup>nd</sup> to the 31<sup>st</sup> of August 2001. Due to his unavailability at these dates, this mission has been postponed to October 2001<sup>3</sup>.

Two seminars are planned to be carried out from now to the end of October 2001. The table 2 presents a tentative program for the IS module in the three involved locations.

**Table 2- Tentative program for Information System module at the three locations**

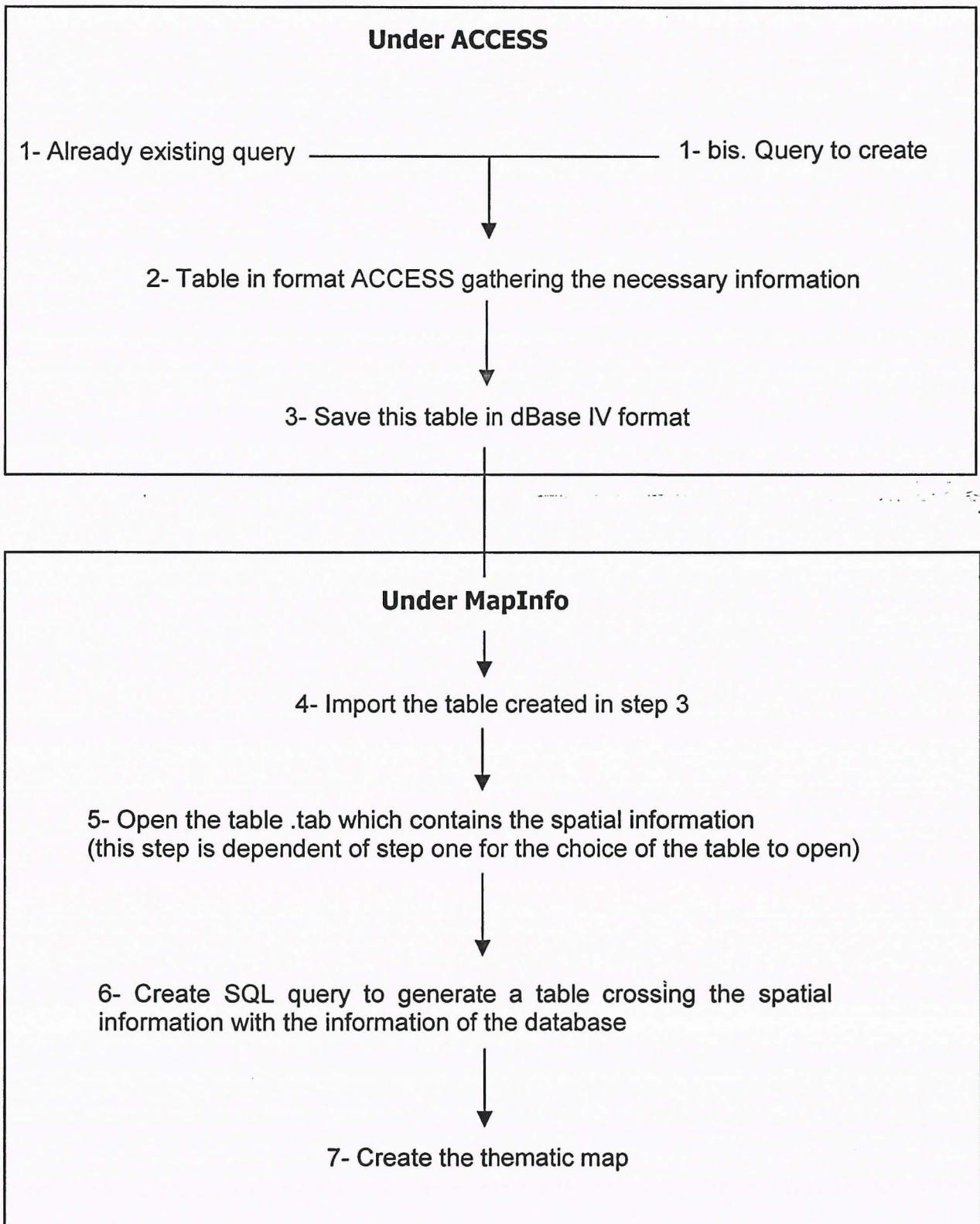
Items	NAERLS	KRIP	HVIP
<b>Reports</b>	27/8		
<b>Seminar 1 by RECTAS trainees</b>	16/8	14 and 15/8	13/8
<b>Applications</b>	One day seminar on IS: sensitization and mobilization of NAERLS staff on IS potential applications Material (Nigerian maps of soils, political maps...) Impact skill to the staff Inventory of the facilities Data collection format	Sensitization and mobilization One day seminar on IS Material (e.g. Maps, Network...) Facilities (hardware...) Data collection forms/format	Decision making with WUA two sectors Integration of IS and AFJM concept Marketing module and data collection
<b>Attendants of the seminars</b>	Rectas trainees (KRIP, HVIP, NAERLS) IS module team Management and interested staff		
<b>Seminar 2 with CIRAD expert</b>	During Marc Despinoy mission (October 2001)		
<b>Remark</b>	Details to be finalized by the trainees and Mr Kuper and Mr Despinoy	Details to be finalized by the trainees and Mr Kuper and Mr Despinoy	Details to be finalized by the trainees and Mr Kuper and Mr Despinoy

<sup>3</sup> Finally this mission was postponed another time to February of 2002.

## ANNEX 4 : AUTOMATIC IS INTERFACE CREATION PROPOSITION

Step to be followed in the creation of a thematic map (S. Balmisse)

The following figure presents the steps for the creation of a thematic map from the information contained in the HVIP Database



**Step by step project analysis :**

**Step 1 (Manual) :**

An interface under ACCESS must be created. This interface must allow the user to choose the criteria for the creation of his map.

It is proposed to keep the criteria used in the current HVIP database in the menu reserved for the map edition (Map\_Menu). The following table presents criteria

Information Field	Year	Season	Scale	Spatial entity	List of maps
Agriculture		Wet Season	Project	Sector	Cropping Intensities
				Field	Cropping Intensities Fallow
			Sector	Sector name	Cropping Intensities Rice CI
		Dry Season	Project	Field	Cropping Intensity
				Sector	Cropping Intensity Tomato CI Vegetable CI Wheat CI
			Sector	Sector Name	Cropping Intensity Vegetable CI Wheat CI
Feeder and Main Canal Condition		Wet Season only	Project	Main Canals	Average depth of external gullies Average depth of internal gullies Embankment profile condition Number of external gullies Number of internal gullies Weeds on the border of the feeder and NMC Weeds in the canal
Network Condition		Wet Season only	Project	Canals and drains	Number of breaches Slide gate condition Siltation Under-cropping Weeds
			Sector	Sector Name	Number of breaches Overtopping Slide gate condition Under-cropping Weeds

**Step 2 and 3 (automatic) :**

From these criteria, it is possible to create or use existing query, which will gather the necessary information in a table and export the table in a format dBase IV. At this stage, the result of the interface must also create a short text file that chooses the table to use under MapInfo (depending on the scale and the spatial entity chosen by the user).

At the end of the step 3, the MapInfo Workspace must be opened.

**Step 4 and step 5 (automatic) :**

A workspace has to be created, which will open the table imported from ACCESS, as well as the geographical layer corresponding to the criteria chosen by the user in step 1. At the end, the workspace must be able to open the Wizard for the creation of a SQL Query.

**Step 6 (manual) :**

The user will create his SQL query. In order to facilitate the creation of this query, it is very important to import from ACCESS the result of a query gathering only the necessary information (to make the choice of the field to select easier).

The automatization of this step seems not to be relevant because the choice of the condition to cross the information is not always the same. However, while creating the interface, this question can be reviewed.

**Step 7 (manual) :**

The user will create his thematic mapping manually, because there is a wide range of choices to make, which depend on many factors (type of information, use of the map, ...). Besides, the MapInfo wizard is helping very much the user and this steps has shown not to present particular difficulties during the different training.

