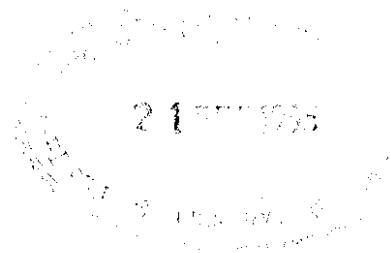
REPORT ON A VISIT TO BURKINA FASO

2-18 March 1994



Charles L Abernethy

Senior Technical Advisor

International Irrigation Management Institute

P O Box 2075

Colombo

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Charles L Abernethy
Senior Technical Advisor, IIMI

Visit dates 2 - 18 March 1994
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INTRODUCTION

1. This report describes the writer's third visit to the Irrigation Management Project in Burkina Faso (PMI-BF) which is a collaborative project between the International Irrigation Management Institute and the Government of Burkina Faso, and is financed by the African Development Bank. The visit took place from 2 to 18 March 1994. Previous visits were in May 1992 and January 1993.

2. The subjects addressed during this visit were:

   a) Outline plan of activities for the temainder of the project's life;

   b) Performance of the five irrigation systems where the project's field research is focussed;

   c) Transferability of recommendations developed at these **5** sites, to other irrigation systems in the country;

   d) Review of various documents arid reports related to the project's activities;

   e) Possible future activities of IIMI in relation to this project and to the country and the region.

3. Field visits were made to three *of* the project sites, Savili (3 March), Mogtedo ***(6*** March) and Dakiri (9 March). On 9-10 March three other irrigation systems, Korsimoro, Dablo and Tamassogho, were also visited.

4. Annexe 1 contains a list of documents examined during this visit. The major item produced by the project since my last visit is the Mid-tem Report of July 1993 (Bilan et Synthese des Travaux, 1991-93; Results and Synopsis of Studies, 1991-93).

PLANNING FOR THE REMAINDER OF THE CURRENT PROJECT

5. The present project began in mid-I991 and is due to end on 31 March 1995. According to paragraph 4.12.3 of the project document, its expected results are:

   i. Development of a methodology for analysing the functioning of irrigation systems and for evaluating their performance;

ii. Making concrete and reliable proposals for improving performance, dealing with:

- technical management of water distribution networks (efficiency, equity and reliability);
- economic performance of irrigation (crop diversification);
- utilisation of facilities (intensification);
- organisation and effectiveness of the transfer of management responsibilities to the farmers;

iii. Making a set of technical and socio-economic recommendations for rehabilitating reservoir-based irrigation systems (policies for agricultural credit, policies for water charges, conditions for farmers' participation in the operation and maintenance of facilities) ;

iv. Implementing a training programme, consisting of both individual and group training events, in order to meet the requirements for professional development directed towards the management of irrigation and, in particular, the utilisation and maintenance of the irrigation systems;

v. Preparation of a practical irrigation management manual in the vernacular language, for use by farmers and by those responsible for operation of irrigation facilities within farmers' organisations.

6. At this point the project has made good progress on most of these items. However it seems doubtful that item (ii) will be fully achieved by 31 March 1995. Progress has been made in identifying and quantifying aspects of performance, but more remains to be done, especially in assessing the financial and economic performance of the farmers' organisations.

7. The Mid-term Report contains a number of specific recommendations. The major task, now, is that these (and other recommendations yet to be developed in the second half of the project) must be connected clearly to aspects of performance.

8. In accordance with item (ii) of paragraph 5 above, we are required to make proposals that will improve performance. The main weakness of the Mid-term Report is that it is usually not clear which aspects of performance can be improved by implementing the various recommendations, nor how much improvement should be expected.

9. The project has now acquired data about several aspects of performance at the five sites. I propose that the team should now decide which are the items that can be improved. Then, the recommendations of the **1993** Mid-term Report should be reviewed and refined, focussing primarily upon these performance improvement targets. After that, the remainder of the project period shuld be devoted to collecting as much evidence as possible about the likely impacts (negative and positive) of these recommendations, *so* that the project's final report can contain, as well as a justified package of recommendations, some predictions also about their expected consequences.

10. In order to accomplish this, it seems desirable to extend the project life by a few months. It would then be possible to conduct the final phase of verifying the likely impacts, during one complete agricultural year, from June **1994** to May **1995.** The schedule **of** main activities would then become:

April-May **1994**	Decide performance improvement targets.
May **1994**	Finalise draft set of recommendations for performance - improvement.
June 1994-May **1995**	Collect field data in wet and dry seasons, to validate these recommendations and estimate their impacts.
May-July **1995**	Write final report.

11. Including also some time for the submitting of the final report to the Government and the Bank, and possibly making revisions to meet any comments made by them, it seems that the project duration should if possible be extended to 30 September **1995.**

12. According to the current rate of expenditure this should not require any additional funding, because the expenditure during the first 70% of the project life has been less than was initially estimated. A summary of funds and expenditure (annexe **2)** has been prepared showing these calculations. There is no reason to suppose that future average rates of expenditure will be much different from the past. The recent devaluation of the CFA franc by 50% should mean that local costs become less in terms of US dollars and of the African Development Bank's Units of Account in which the project grant is denominated.

13. As well as helping in the formulation of performance-based recommendations, an extension of the project's life should have beneficial effects in two other areas. First, it should allow the project to devote more attention to study of some institutional structure questions, concerning both the farmers' organisations and the government organisations. Suggestions about the work that should be done in each of these areas are given below. Secondly, it will enable the project to integrate the two Workshops (one regional and one national) which are required under the project document. Specific suggestions for the conduct of each of these events are given below.

PROJECT WORKSHOPS

14. In accordance with paragraph 4.9.5. of the project document, and section 4.2.E of the Annex thereto detailing the project activities, the project is expected to organise (under its Training component) a national level workshop at the end of Year 3 (i.e., about March 1994) and a regional workshop at the end of the project. The national workshop is envisaged to be of 2 days' duration and the regional one 3 days. The first such national workshop, in February 1993, considered the theme "what environment for the development of irrigation in Burkina Faso?" and led to the production of a volume of papers, concerning the institutional framework for irrigation.

15. To fit these into the suggested revised schedule of events proposed above in paragraph 10, the national workshop could be held in May 1994, and could be organised around the theme "What results do we desire from irrigation systems in Burkina Faso?" This would provide an opportunity to discuss in depth the questions about the objectives and the performance criteria for irrigation systems, which the project studies have provoked. If the workshop can be held in the middle of May, then the ideas developed in it can be taken into account in the final year's field programme.

16. This workshop can be smaller than the 1993 event. The project document mentions 15-20 participants, which seems to be an appropriate number (in addition to the project team). There should on this occasion be some participation from IIMI staff outside the West Africa region, in order to bring ideas about irrigation objectives from other environments. It is not necessary on this occasion to request many papers in advance, because the main purpose should be to generate ideas in active group discussions. Two or three keynote papers should be enough.

17. The regional workshop should be held (according to the suggested extension of the project) about August 1995. Preliminary planning for this, to decide which countries should participate and how large the event should be, is needed within the next 4-5 months, **so** that invitations to prepare papers can be issued in good time. A general theme must also be chosen, to make sure that this meeting deals with different subjects from the Workshop on rice irrigation which will be organised by the West Africa Rice Development Association (WARDA) in April 1995.

IRRIGATION PERFORMANCE

18. The Mid-term Report and the national workshop **of** February 1993 produced a number of suggestions for institutianal and physical actions, to improve the systems. A summary of these recommendations **is** included in Annexe 3. These suggestions present a difficulty, however. The difficulty is that it is usually not clear what benefits will come, if these proposals are implemented nor who will get those benefits, ideas such as amending the legal framework, or clarifying the co-operatives' structure, or developing the national water fund, or establishing a technical audit system, all have apparent merits. However it is not clear which aspects of irrigation performance are expected to improve, if these actions are taken.

19. Irrigation performance **is** a complex subject. There are many participants in irrigation. What seems to be a benefit to one group **of** participants may seem adverse to another group. An obvious example of this is government expenditure: policy - makers usually consider that reduction **of** government expenditure per hectare is a desirable target, but farmers and employees of the government bureacracies do not usually think **so.**

20. Another example is the problem of the size of land holdings in irrigation systems. There is evidence, from Dakiri as well as Gorgo (see Figures 1 and 2), that if the size of holding is increased, the yield per are is less, but the output per person is more. ***So,*** if the dominant objective is to obtain the maximum production from existing irrigation facilities, it seems that policies should aim at keeping the size of holdings very small. On the other hand, it is likely that the individual farmer's objective is to get as much output as possible from his or her labour; by that standard, it seems desirable to enlarge the size of holdings.

21. The project has now acquired data, for at least one year, at each of the five sites, on most of the principal aspects of performance. There may be data quality or confidence problems about some iterns, and the time-base is not very long; but the data bank now assembled seems to be enough far the next key decisions, which should be taken before the end of May 1994.

22. These key decisions are in the following logical sequence:

a) What are the most important objectives that should be aimed at in any institutional reform or rehabilitation actions?

b) What performance deficits can we identify? (That is to say, in regard to any items where the observed performance is judged to be weak, what performance level do we think we can aim for?)

c) What do we believe are the causes (determinants) of these performance deficits?

d) What actions may remove or reduce these causes, and **so** may elevate the performance levels?

23. If this line **of** questions can be addressed during April and May, with inputs from people outside the project during the national workshop in May, then the answers to item (d) will become the set of draft recommendations, for performance improvement, mentioned in paragraph 10 above.

24. The final agricultural year available for the project should then be focussed, primarily, **on** collecting evidence to help us to estimate the performance impacts of the draft recommendations. Such evidence does not all have to be obtained from the present 5 sites. Some may be obtained there; some may be obtained by analogy with other sites in the country; some may be obtained from the experiences of other countries.

25. It is for the project team to decide which are the major objectives where we are trying to produce performance improvements. The following list is offered as a suggestion; other items could be added. These are some possible goals:

Increase annual production of rice

Increase gross annual value of all production

Reduce consumption of water

Increase area of land irrigated

Increase average gross incomes *of* farmers

Increase average net incomes of farmers

Increase income of co-operative organisations

Reduce government expenditure

Increase the number of people benefitting from irrigation

Of course, no policies are likely to deliver all of these benefits. That is why it is necessary to select major goals, and also to assess whether proposed actions might have contrary effects in regard to some of the secondary goals.

26. The following paragraphs contain some comments on specific items of the performance data which have already been collected. Annexe **4** contains a brief summary of major data items at the five sites.

Crop intensity

27. The present information about crop intensity may not be quite accurate. For example, we regularly assume that land at Dakiri is cultivated 100% in each season (page 89 of Mid-term Report, for example). Sophie Le Vu's report on Dakiri however gives two charts (page 18) indicating that about 12% of the sample did not cultivate in the wet season, both in 1991/92 and 1992/93.

28. At other sites also, the assumption **of** 100% cultivation in the wet season is usually made. This should always be verified in the field. We must give as much attention to crop intensity as to crop yield, because crop intensity **is** one of the best indicators of farmers' motivation. **Also,** we cannot know the production of the system unless we have accurate intensity data.

Collection **of** irrigation **fees**

29. In other countries where governments are following disengagement policies, and trying **to** transfer irrigation systems to the control of farmers' organisations, the level of collection of irrigation fees is usually monitored closely, and is considered one of the best indicators of the strength of the farmers' organisation. In the Philippines (which is the pioneer of these policies) it has been treated as the principal indicator.

30. The project should try to get better information about this. A paper by Projet Sensibilisation at the February 1993 Workshop (page 113) gives information about the Gaskaye system, where it seems that collection efficiency was just under 60% over the three years 1989-92, and was 73.5% in the single year 1991/92. In view of the recent problem of arrears at Dakiri, it seems important to establish what efficiency is being achieved at each of our five systems. A collection efficiency significantly less than 80% is probably not a sustainable situation, because farmers will refuse to contribute if they know that there many others who escape from payment.

Crop Losses

31. The financial performance calculations in pages 73-87 of the Mid-term Report probably give a too favourable impression about the income obtained from horticulture crops, because it is assumed that all the production can be sold. For perishable crops, without cold storage facilities, there is probably significant loss, especially in the weeks when supply to the market is near its maximum. It would be valuable, if the project team could develop estimates of the ratio between the amounts produced and the amounts successfully marketed.

Crop prices

32. Similarly we should ensure that calculations about financial performance of the five systems use the average prices actually obtained by farmers. For example, Sophie Le Vu's report contains data (page 38) which suggests that the average price obtained at Dakiri was about FCFA 6,150 per bag (or FCFA 77 per kg) not 6,500 per bag as in Table 10 (page 73) of the Mid-term Report, or FCFA 85 per kg as in Table 11 (page 74).

33. These last two items become highly important if the net income of farmers is selected as one of our major performance goals.

TRANSFERABILITY OF FINDINGS TO OTHER SITES

34. The question of the representativeness of the project's five sites, and the transferability of findings to other sites in the country, remains very difficult to analyse. It may have to wait until the steps proposed in paragraph 22 have been completed. Even then, it seems that we must expect some data deficiencies which will complicate the analysis.

35. Essentially this matter depends on our opinion about the determinants of performance (including constraints, which may be negative determinants). As noted in item (c) of paragraph 22, part of the process of finalising the draft recommendations should involve deciding what are the factors which will influence our principal performance targets. When that assessment has been done, the transferability problem can be resolved, on the basis that sites which experience the same levels of the determinant factors should respond to the same performance improvement actions.

36. Some examples of factors which (in my opinion) are likely to be determinants of certain aspects of performance are:

    a) Ratio of dam volume to land irrigated.

    b) Frequency of filling of the dam in the wet season (this could be assessed approximately by the ratio of darn volume to catchment area).

    c) Local mean annual rainfall.

    d) Ratio of rain-fed land to irrigated land.

    e) Ratio of area irrigated to number of persons active in agriculture (i.e. labour resource per are).

    9 Strength of the system's co-operative.

    g) Access to markets.

    h) Proportion of the irrigated area which suffers land-level problems (high or low).

    i) Whether irrigation water is pumped.

37. Item (9, strength of the co-operative, can be assessed from such indicators as the fee collection.

38. The visits to sites outside the project sample (Dablo, Tamassogho and Korsimoro) indicated that there will be further difficulties. The figures given in the Inventory of small irrigation systems seemed to be incorrect in important respects.

39. Under the first item of the project's expected results (paragraph 5 above) a methodology of assessing systems is to be developed. I think this does not refer to the methodology which the team has developed at the five sites, because that is a methodology for intensive study over long time periods. We should also, in the next year, develop a cheap and rapid methodology that can be applied at other sites, using the ideas generated by the project. I suggest that the best way to satisfy this requirement is by developing the lists of performance goals and of determinant factors (including constraints). Then the rapid appraisal methodology will consist of procedures for establishing approximate values of each of these (present performance levels, and determinant levels) in a low-cost way.

OBSERVATIONS AT OTHER SITES

40. **As** part of the process of considering the issues of transferability of the project's findings, visits were made to Korsimoro, Dablo and Tamassogho irrigation systems. The aim was to form some opinion as to whether other systems seemed to resemble members of the set of five sites where the project does its main work.

41. The question of the representativeness of the five sites, with respect to the set of 64 such systems in the country, was discussed at some length in my report of 1993.

42. Table **1** lists certain principal parameters of these systems, and compares them to the five project systems. The data in Table 1 come from the inventory of small irrigation schemes (reference 14 of Annex 1). However, the visits showed that there are some errors in the inventory data. There are also some errors in relation to the five project sites, so this may not be a satisfactory source for analysing the question of representativeness.

43. The Korsimoro system has a quite large catchment, a dam with above average volume, and a relatively small irrigated area, so water is abundant The storage-land ratio is 12.1 metres, which is more than at any of the project sites. Because of its large catchment area (around 1000 km^2), the spillway flows frequently. Flooding; from the spill channel, is frequent. The relatively long and narrow layout of the irrigated command means that a long protective dyke is necessary for flood prevention. Maintenance of this is a major expense.

44. Because **of** the large water surplus at this system, several independent irrigation developments have taken place upstream, based on direct pumping from the reservoir to adjacent land areas. There is apparently little interaction between the

users of the "official" downstream command and these new upstream users. In this sense there could be some similarity to the Mogtedo situation, but probably this situation causes less friction between the groups of users than at Mogtédo, because of the much larger water/land ratio.

45. At Dablo the situation is opposite to this. The reservoir is near the top of its catchment. It has never spilled, and dry season cultivation is not achieved. Indeed the signs of vegetation etc. suggested that it may usually reach only a half full condition. It seems to be a case of defective hydrological estimating in the design stage. Nominally it has a storagelland ratio of 11.5 metres, but this shows that the storage volumelcatchment area must also be taken into consideration.

46. The developed area at Dablo has been increased from 16 ha to 52 ha by a recent rehabilitation.

47. At Tamassogho, as at Korsimoro, some active horticultural cropping was proceeding upstream of the reservoir, based on small pumps. In contrast, no cropping was occurring in the formal command, although the volume of water in the reservoir seemed reasonably good for this stage of the season. We were told that the CRPA's organiser had not come to initiate downstream irrigation, *so* the farmers had not planted. The storagelland ratio at Tamassogho is **5.9** metres, which (according to the project's experience elsewhere) should be sufficient to support at least 150% crop intensity, and the catchment is evidently large enough to fill it, **so** the lack of interest by the farmers was difficult to explain.

INSTITUTIONAL STUDIES

48. There is some rather serious weakness in the project's institutional studies, because of the difficulties over obtaining seconded sociologist staff in the team. This area is very important, **so** it seems that the necessary skills may have to be obtained by engaging a consultant.

49. Two main lines of institutional study are needed: studies of the co-operative organisations, and studies of the government's technical support organisations, the four CRPAs.

50. Studies of the co-operatives should take account of the experiences of farmer-managed irrigation systems in other countries. There is a great deal of knowledge (especially from the Philippines), much of which has been published, about the problems **of** establishing and motivating new farmers' organisations, and making them sustainable. A visit by Dr. Wijayaratna (formerly head of IIMI-Philippines) or Mr. Ben Bagadion (formerly Assistant Administrator, Philippines National Irrigation Administration) could produce useful ideas.

51. Two or three points occur to me about the present co-operatives, in addition to the questions about lack of clarity of the legal framework which were extensively discussed in the February 1993 Workshop and in the Mid-term Report, and which I agree with fully. First, the groups are very big (up to 750 members) and groups of this size do not usually perform satisfactorily unless there is some formal structure at a lower level, such as block or channel committees. Secondly, there seem to be problems about transparency and accountability, which some people say are linked to the relationship of these new organisations with traditional rural power structures. Thirdly, the single organisational model, imposed by the laws and policies, does not encourage the organisations to evolve in a dynamic way. The example of the Philippine irrigators' organisations, where there are three organisational levels, and strong organisations can gain the right to undertake larger ranges of activities, by rising up this ladder, could be relevant. At present, Burkina Faso has two levels, the pre-co-operative group and the full co-operative, but there seems to be no practical difference between them.

52. The behaviour and cost-effectiveness of the CRPA system should also be considered by the project. It should not be considered as an inevitable feature of the scene. The team should review what services the CRPA gives, what budget the government provides for these services, and whether the same services might be provided in some other way. According to page 14 of the current BRIAO, the irrigators of Petit Bagré employ their own organiser (encadreur) directly. The project should consider whether it recommends this generally.

SEDIMENTATION OF RESERVOIRS

53. The project's performance data (see Annex 4) suggest that the storage volume/land area ratio is a significant determinant of agricultural outcomes, because of its effect on the potential crop intensity. The data suggest that a ratio of around 5.0 metres is necessary in order to achieve a second crop on a substantial fraction of the command.

54. This ratio could be affected by sedimentation of the reservoirs. There appears to be little information about this, but perhaps there is some that I have not seen. A study at Goundi reservoir, mentioned in reference 16 of Annex 1, showed that the observed sedimentation was equivalent to a catchment erosion rate of 0.16 mm/y. This is not high by current standards in semi-arid landscapes with significant livestock populations; indeed a level of 0.3 - 0.5 mm/year would not be surprising. The implications are quite substantial. At Dakiri, where the catchment area is 2,300 km^2, an erosion rate of as little of 0.1 mm/year would produce 230,000 m^3/year of sediment. The trapping efficiency (ratio of sediment retained in the dam to total sediment delivered) is probably quite near 100%, since the dam water level is very low when the rainy season commences. So it is very likely tht Dakiri

reservoir is lc ing 2% of its volume each year. This dam is now 35 years old. A sedimentation process could be the explanation of its water supply difficulties at the end of the 1993 dry season, because it seems very likely that the actual volume in this dam is now significantly less than the 10.5 Mm^3 nominal figure which the project has been relying on.

55. The study, based on remote sensing, which is reported in reference 19, and which concluded that sedimentation had proceeded at only 25,600 m^3/y, equivalent to an erosion rate of 0.011 mmly, appears to me to be unsound in its methodology and not credible.

56. The project should do what it can lo improve knowledge of this area. Rapid sedimentation is one of the greatest risks in this scale of development. Populations may grow much larger because of the existence of a reservoir, and if that reservoir is silted in a relatively short period such as 30-40 years great hardships can occur among the dependent population. Improved prediction of the reservoirs' viable life-spans seems to be a necessary aspect of planning.

RUN-OFF AND FILLING OF RESERVOIRS

57. As noted above in regard to Korsimoro and Dablo, the size of catchments, and the run-off that they can generate, may be a significant factor in performance. The Korsimoro reservoir has a storage/catchment area ratio of about 4.95 mm. That means that 4.95 mm of run-off from the catchment would just fill the reservoir. Since it spills copiously, it seems that actual seasonal run-off must be much more than 4.95 mm.

58. On the other hand at Dablo the reservoir is larger and the catchment much smaller, so the storagelcatchment ratio may be as much 60 mm. (I do not know exactly, because the exact catchment area is not known). This is evidently larger than the run-off generated.

59. At Mogtedo this value is 13.8 mm, arid at Dakiri it *is* 4.6 mm (or less, if we follow the sedimentation argument above). At Savili, howevr, which fails to fill in about half of all years, the ratio is 12.0 mm.

60. The study by I. Ouedraogo of hydrology at five small reservoirs showed that run-off varies very widely from year to year. Over a 5-year period he found the following statistics of run-off (in mm) :

	Minimum	Mean	Maximum
PABRÉ	2.6	25.5	61.2
MOGTÉDO	5.0	28.4	69.4
TOUGOU	22.4	58.1	86.8
DONSÉ	7.9	63.1	132.5
PETIT BAGRÉ	36.0	127.0	315.0

6 It seems that (allowing for variations in rair ll and infiltration ε different catchments) reservoirs with a ratio of 5 mm or less should usually have a high confidence of filling, and those larger than 30 mm should expect substantial problems except in the south. It may however be useful for the project to conduct some more analysis of the influence of this parameter, and particularly to check whether there are many other systems with catchments as small (relatively) as Dablo.

FUTURE ACTIVITIES OF IIMI

62. Following are some suggestions about IIMI's inputs, in the remainder of this project and thereafter.

63. During the remainder *of* the present project, the principal inputs to the project from other IIMI offices should be:

a) Participation in the May 1994 Workshop. I suggest that I and one other should join in this. The choice of person probably depends upon the dates selected for the Workshop. It should be someone with particular interest in irrigation performance.

b) An advisory visit of about one week from someone familiar with FMIS and hand-over of irrigation systems to farmers' organisations. Because of his familiarity with these problems in the Philippines, Dr. Wijayaratna may be most suitable; otherwise Dr. Vermillion, or Mr. Bagadion.

d) Participation in the August 1995 regional Workshop. About three people should join in that.

e) Assistance at some point during the report-writing phase, say in June 1995.

As far as possible, IIMI visitors to the project should know enough French at least to read documents in that language.

64. IIMI should not develop other studies under its core funds, except the proposed work on gender issues, during the next 12-15 months, because the project tasks are now formidable and will require all the team's resources. The study on interactions and integration of rainfed and irrigated farming, proposed recently by Dr. Samad, would be valuable, but should be envisaged to start (if IIMI core funds will support it) about September 1995.

65. IIMI should begin now to plan for continuity of the BRIAO and Namanegdzanga publications, after the funding provided under this project ceases. BRIAO should be expanded to involve more counlries, especially anglo-phone, because this should increase its supply of material.

66. IIMI should anticipate that there will probably be some gap in its direct work on Burkina's irrigation problems, in the months following the end of this project. Burkina Faso does not have a large irrigation sector, and since the present project addresses a significant fraction of that, it will be appropriate for the findings of this project to be assimilated before the direction of further work is defined. If the suggested program of "Dialogue and Training" in Sub-Saharan Africa, which has been proposed separately to the African Development Bank, can be initiated, then the period immediately after September 1995 should be used to establish the IIMI Ouagadougou office as the organising focus for that activity.

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7 April 1994

FIGURE 1

EFFECT OF HOUSEHOLD SIZE UPON PRODUCTIVITY OF LAND AND OF LABOR, AT DAKIRI

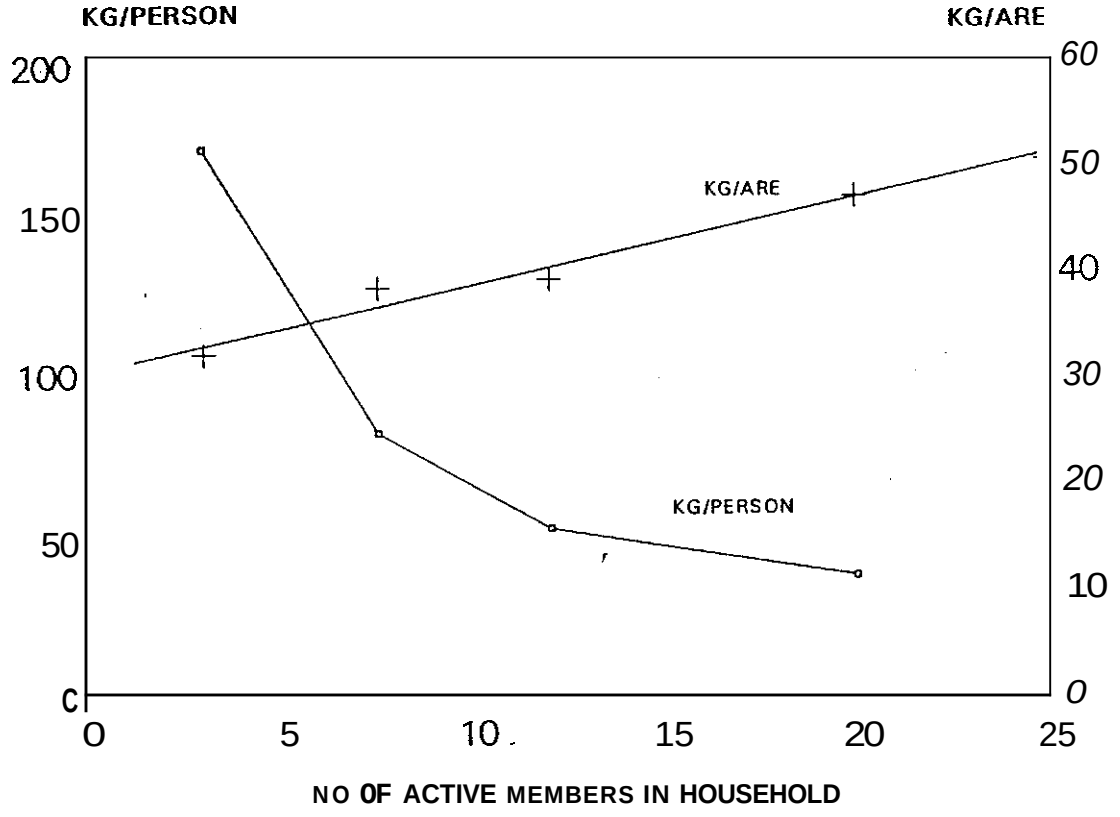

FIGURE *2*

EFFECT OF LAND/LABOR RATIO UPON PRODUCTIVITY OF LAND AND OF LABOR, AT DAKIRI

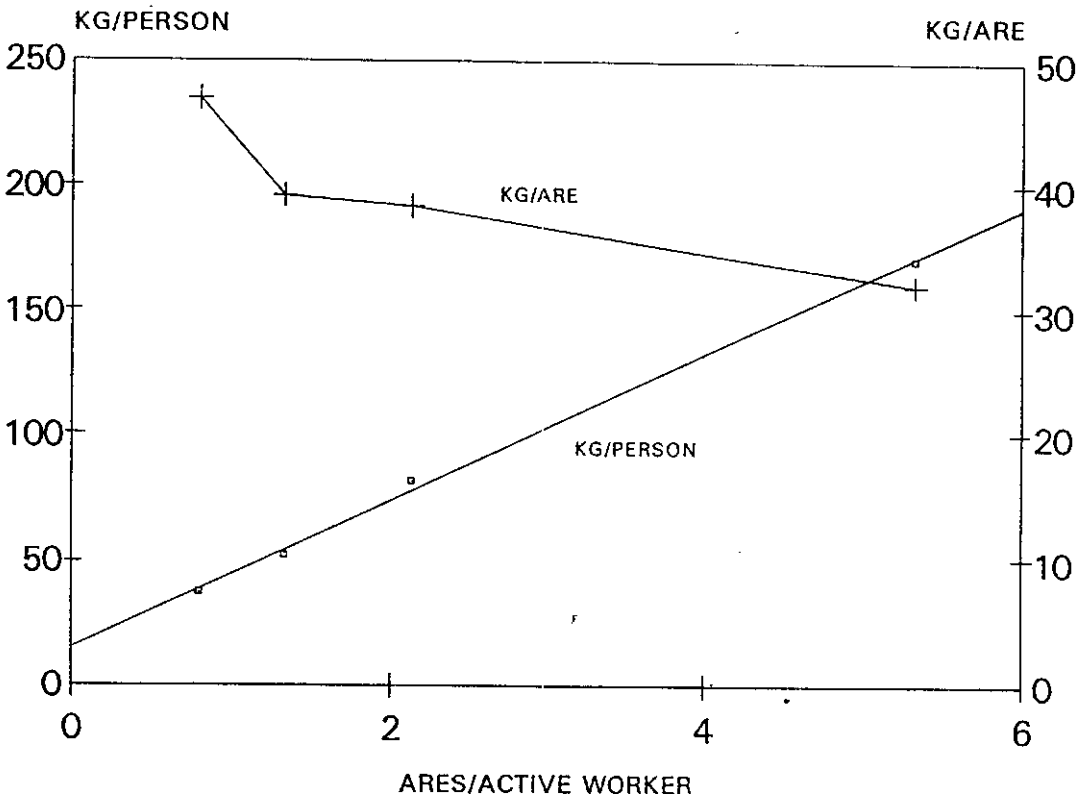

FIGURE *3*

EFFECT OF HOUSEHOLD SIZE UPON PRODUCTIVITY OF LAND, AT GORGO

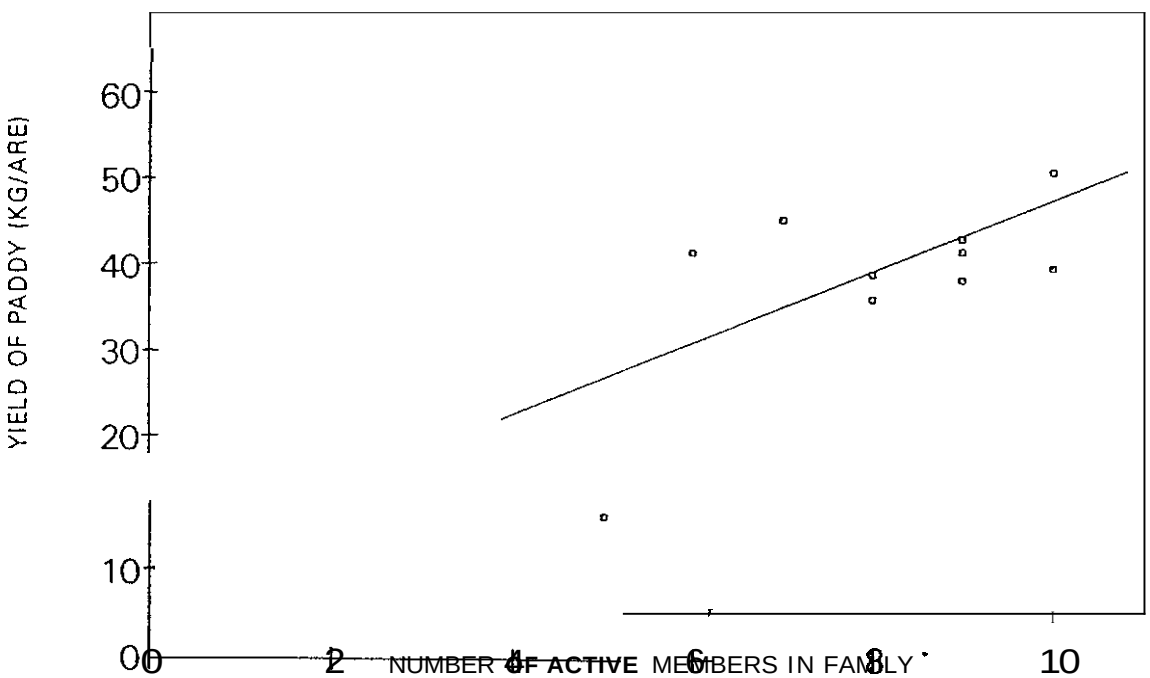

TABLE 1

Principal parameters of the three additional sites visited, and of the five project sites

PROVINCE	KOFSIMORO Sanmatenga	DABLO Sanma tenga	TAMASSOGHO Sanma- tenga	DAKIRI Gnagna	MOGTEDO Ganz- ourgou	SAVILI Boulk- iemde	ITENGA Koupela	GORGO Koupela
DEVELOPED AREA (HA)	31	?	50	120	101	42	58	50
CULTIVATED AREA (HA)	41	16	60	112	128	42	48	50
NUMBER OF FARMERS	?	265	346	740	400	168	268	212
RESERVOIR CAPACITY (000 M³)	4950	6000	3540	10500	2900	2300	3350	300
YEAR OF CONSTRUCTION	1986	1978	1978	?	1963	1983	1987	?
YEAR OF FIRST IRRIGATION	1989	1978	1980	1984		1986	1989	

Source of **data** : Annex 1, reference 14.

ANNEX 1

Documents examined during the visit

PROJECT MID-TERM DOCUMENTS

1 PMI-BF/IIMI : Bilan et synthèse des travaux 1991-93 July 93.

2 F GADELLE, F HUIBERS, B GUISSOU, B BATIONO : Rapport de la mission d'evaluation à mi-parcours, 23 août au 10 septembre 1993. Ministère de l'Eau/BAD/IIMI. Sept 1993.

3 Responses to item 1 by :

- a African Development Bank
- b ONBAH
- c Ministère des Finances et du Plan
- d Ministère de l'Eau

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ANNEX 2

CURRENT STATE OF PROJECT FUNDS AND EXPENDITURE

1 The project grant is stated in the African Development Bank's Unit of Account (UCF). This is computed in terms of a basket of main donor currencies, so the $/UCF exchange rate fluctuates. The most recent figure we have (8 Dec 93) is UCF 1.00 = US$ 1.418, but it has been both higher and lower than this.

2 The original project budget was for UCF 2.543 M, equal at that time to US$ 3.761 M. Of this UCF 0.297 M (US$ 0.439 M) represented the national contribution, given in kind principally as seconded national staff.

3 The grant by the African Development Bank was for UCF 2.246 M (initially US$ 3.322 M).

4 The Technical Assistance component of this, from which IIMI's inputs are principally financed, was UCF 0.594 M (then US$ 0.879 M)

5 Of the total project grant of UCF 2.246 M, disbursements in respect of all activities up to 31 December 93 totalled UCF 1.342 M.

6 The accounting is done quarterly, and since the grant period formally began on 1 April 1991 and is due to end on 31 March 1995, 31 December 93 represents the completion of 11 out of 16 quarters, or 68.8% of the project life.

7 Thus in 68.8% of the project life, 59.8% of the funds have been disbursed. The budgeted average expenditure rate was UCF 140,375 per quarter. The actual disbursement rate has been UCF 122,000 per quarter.

8 There is no source of significant time-lag in the disbursements from the Bank. Indeed (see para 10-11 below) its disbursements may be a little ahead of actual expenditure.

9 IIMI (Colombo) maintains its accounts, for the Technical Assistance component only, in US dollars. It assumes that the original dollar equivalent, US$ 879,000, is to be available. There is probably not a great error in this assumption, but it is possible that the residue now remaining (in UCF terms) is not quite as much as IIMI Colombo calculates.

10 IIMI Colombo draws down the Technical Assistance at a more or less uniform rate of US$ 55.000 per quarter, billing the Bank for this amount, which, pro rata, will mean the grant is fully disbursed by 31 March 95. However actual expenditure by IIMI on this component is not at this rate.

11 Actual charges debited on IIMI internal accounts, up to 31 December 1993, were US$ 516,000, leaving a balance of US$ 361,000.

12 Thus, in 68.8% of the project life, 58.8% of the Technical Assistance funds have been expended.

13 On the Technical Assistance component, average quarterly expenditure over the past four quarters was US $ 52,400. At this rate, the unexpended residue of $ 361,000 would suffice for 6.89 quarters beyond 31 December 1993 : i.e., until late September 1995.

14 On the total grant, average quarterly disbursements has been UCF 122,000, and so the residue of UCF 904,000 should suffice for 7.41 quarters beyond 31 December 1993 : i.e., until mid-November, 1995.

15 The devaluation of the CFA franc by 50% in January 1994 has the effect that local charges to the non-Technical Assistance components are now substantially lower in terms of UCF or dollars. No doubt local prices will drift upwards; but the effect of the devaluation should still be that project funds will last somewhat longer than the above uniform-rate calculation predicts.

16 Thus it seems clear that the available funds are adequate to cover continued activity at approximately the same rate as hitherto, up to 30 September 1995. It may prove necessary to request a small re-allocation into the Technical Assistance component, from one of the others; but even that can probably be avoided.

17 Expenditure is of course not uniform in time, and the project should recalculate its cash flow predictions, to ensure that the above outline is supported.

ANNEX 3

Summary of recommendations made in the Mid-term Report, July 1993

There are six groups of conclusions and recommendations, at different points of the text. The sixth set is an overall summary. Below is a shortened version of each of the six groups.

1 OBJECTIVES OF IRRIGATION (Pages 91-92)

Conclusions :

a Irrigation objectives vary according to context. Two major categories are these :

i The objectives are social if the plot size, or potential, is inadequate to sustain a normally-remunerated full-time occupation for the user;

ii The objectives are economic if the plots can support full-time, normally-remunerated occupation for the user and active family members and/or provide income for family self-sufficiency in food plus some surplus.

b In either case, irrigation is an investment, which the State should support either by direct subsidy for infrastructural interventions that are beyond the users' capacity, or by giving incentives for private initiative.

c Irrigation organizations perform most strongly where farmers' organizations are strong and where they co-operate with traditional authorities. Irrigation objectives evolve towards compatibility with the norms of traditional rural society.

Recommendations :

a The objectives of irrigation must be clearly stated, because they determine the criteria of performance evaluation, and the conditions for performance-enhancing interventions to support farmers' organizations.

b Internal evolution of objectives, within the systems themselves, must be accepted and encouraged.

c Flexibility, and the capacity to assimilate change, should be a feature of designs and of operating rules. Overall policy should foresee the need for changes, in order to avoid damaging anarchic behavior.

2 THE NECESSITY OF A CLEAR INSTITUTIONAL FRAMEWORK FOR MANAGING FACILITIES

Conclusions :

a The development of small irrigation systems has aimed at social objectives. They sought to improve the quality of life of the largest possible numbers of people at the least cost; and thee people were to be in control of their own development through a co-operative organization.

b The technical arrangement of the facilities was based on an assumption that their management must be collective and egalitarian.

c A co-operative form of organization was obligatory, up to 1991, and membership of it is a condition for allocation of plots. The co-operative principle is egalitarian, based on joint work toward joint objectives and joint decisions about uses of revenue. Traditional rural society is inegalitarian with superior rights for chiefs, elders, males; and it functions on a principle of reciprocal obligations.

d The field studies have shown that the normative rules of the co-operatives have been overwhelmed or captured by the local social or economic structures. The rules of traditional society reappear within the irrigation systems. Frequent amendment of the legal framework has the effect of obscuring the social links.

e The organization of an irrigation system is at present regulated by three official legal texts of general applicability, plus several more that are specific to irrigation developments.

f The three general texts are Zatu of 18 May 1990 dealing with pre-co-operative groups and co-operative societies; Zatu of 4 June 1991 dealing with agrarian and land reform; and Raabo of 9 August 1990 dealing with the schedule of responsibilities for exploitation of irrigation facilities. There are gaps and contradictions, concerning the schedule of responsibilities, the existence of a management committee that links the farmers with the public administration, and on other matters.

RECOMMENDATIONS

a It is necessary, for good operation of the farmers' organizations, that the legal texts be harmonized. In particular a new schedule of responsibilities, consistent with the agrarian and land reform law, is needed, with special attention to : plot allocation; issue of land titles; conditions for use, maintenance, management and extension of facilities; and irrigation fees and other charges.

b The possibilities offered by the agrarian and land reform of **1991** should be applied, perhaps in pilot projects. There is no longer any legal obligation that management of irrigation facilities must be by a co-operative. This raises issues such as :

i Should we persist with adaptive research on the co-operatives, when the socio-cultural context makes it difficult to apply co-operative principles ?

ii Would it be better to seek to control behavior within the systems by entrusting the public authorities with supervision of observance of laws and rules ? Such control, over administrative, financial and technical aspects could be achieved through a system of "audits."

c In the context of the government's present policy for disengagement of the State from direct management of irrigation facilities, and greater farmer involvement, the roles to be played by, respectively, the State, the farmers' organization, and the individual cultivator, need clearer definition.

3 LAND TENURE FOR IRRIGATION SYSTEMS

Conclusions :

a Management of land within an irrigation system requires:

i Observing certain standards in the use of land holdings;

ii Restricting and controlling unplanned extensions of the irrigated area;

iii Registering and controlling transactions in land entitlements.

b The financial investments in constructing and operating irrigation systems are substantial. The State, along with foreign donors, has often the sole capacity to sustain these investments, and has therefore been the principal promoter of irrigation. Land tenure systems, which have varied according to the political climate, have had little effect on the management of irrigated lands.

c The system of individual land ownership has had little application in irrigated lands, for two reasons : the high cost of investment, and the lack of interest of private investors in a new production technique, in an adverse economic environment.

d The practical, daily reality is that irrigated lands are under two types of land management, one traditional, one modern. Each of these is supported by its own logic; but in many respects they conflict with each other.

Recommendations :

a The land allocation process should be reviewed. Considering the conservative tradition of rural society, allocation of plots should combine the social unity of a group of allottees with the operational unity of the system. This could be achieved by allocating land according to criteria of social homogeneity.

b Land tenure is in a phase of transition, between on the one land a system of collective utilization in which the benefits are controlled and distributed by the traditional authorities, and on the other an individual system in which title to land is controlled and distributed by the public authorities.

This transitional phase, which may be long or short, must be managed with respect to :

i practical application of the full range of actions permitted under the agrarian and Land reform law of 1991;

ii establishment by relevant. ministries of a schedule of responsibilities, for allocation and use of irrigated lands;

iii regular Audits to supervise observance of rules;

iv information to the rural pdpulation about the advantage of modern land management (inheritance, sale, debt security, etc);

v training of rural leaders in management and law;

vi involvement of the traditional authorities in this evolution of the land tenure system.

We must be'aware that this will be a slow, progressive process of change, which must be supported by clear, comprehensible legal texts.

4 WATER MANAGEMENT IN THE CONTEXT OF DISENGAGEMENT BY THE STATE

Conclusions :

Features of the present situation in the irrigation systems include:

a The hydraulic operations of the systems are often defective, due to insufficient maintenance and, sometimes, due to imperfections in planning, design or implementation. Thus, there are often land-levelling problems, with plots either too high to irrigate or too low to drain easily.

b Weak motivation of the users, for rational management of what seems to them an abundant resource in the wet season.

c Lack of discipline in water management and system maintenance. This results in feeble flows to some plots, and excess on others, causing crop damage.

d Competition between rainfed and irrigated crops. This leads to delay and prolongation of irrigation activities, and hence diminishes considerably the available water resources, makes optimal management difficult, and delays the dry-season planting.

e Anarchic development of the adjacent areas, with uncontrolled extensions of the irrigated areas and clandestine withdrawals of water, in pursuit of individual objectives, not those that were planned.

f The development of complex social linkages governed by traditional rules, which are opposed to the installation of a modern type of management.

g The low educational level of the users and of the office-bearers of the farmers' organizations.

h Lack of procedures, facilities and awareness about the value of collecting basic data on system operation, which prevents quantification of performance of the facilities. The data recorded by the farmers' organizations are intermittent and not part of a coherent monitoring plan.

i Lack of an organizational framework encompassing the different users of the reservoirs (fishing, agriculture, livestock).

j Interface problems between the organizations designing and c nstructing the facilities, and the agencies of the Ministry of Agriculture which provide technical support to the users. The latter take over this responsibility without having been involved in the earlier phases, and perhaps without information about the operating principles. Moreover they lack sufficient appropriately-trained technical staff.

k The state supervises these systems in an unsystematic way. Lacking resources, it intervenes only intermittently. These interventions are limited to official reports of deterioration, but it is not possible to mobilize, in an acceptable time, the finance for resolving these problems.

Recommendations :

a Disengagement of the State is accompanied by increased involvement of the users of irrigation, and clear partition of responsibilities among the State, the farmers' organization, and the farmers. The division of responsibilities will differ as regards water resources management, water distribution, and water application at the field.

The State will retain full control at the level of water resources management. To finance its interventions, a Water Fund could be created, using taxes applicable nationally to all water users (urban drinking water, industrial water, agricultural water). The control of this Fund would be entrusted to the Ministry of Water.

In particular the Water Fund would :

i finance studies for rehabi'litation of badly deteriorated structures;

ii finance major maintenance of hydraulic works consequent upon exceptional deterioration and beyond the scope of the farmers' organizations;

iii select the contractors or consultants for executing these tasks;

iv oversee the irrigation facilities

Its resources would come from taxes on water abstractions by urban consumers, by users in agriculture, industry, and civil engineering; and pollution taxes.

The farmers' organizations will control management downstream of the dam, including agricultural exploitation of the command area, input supply and credit, collection and marketing of outputs, preventive maintenance of water distribution facilities and maintenance of small structures at field level. Maintenance costs will be met from users' fees. In case of serious deterioration due to exceptional circumstances the State may intervene as necessary through the Water Fund.

b A Technical Audit should be Instituted, to monitor regularly the maintenance and management of the facilities. The costs (estimated at 5,000 FCFA/ha) would be included in the irrigation service fee. The Ministry of Water and the farmers' organization would jointly formulate the terms of reference of the audit and select the implementing organization. The costs of repairs and rehabilitations proposed by the Technical Audit would be borne by the farmers' organization with, sometimes, support from the Water Fund.

c There are many users of the water of the reservoirs. They include farmers, pastoralists, fishermen, urban users, public services. In these circumstances the transfer of responsibility to users must be planned in the context of participation of all those concerned. The creation of a users' association would be one way to arrange for dam maintenance and water resource management.

d Appropriate sanctions should be recommended against all who take actions harmful to conservation of the resources and infrastructure. The sanctions may be financial or penal according to the gravity of the offence, and their application would be in the hands of the competent authorities of the State. The water resources and the works for collection and distribution of water are a national heritage Acquired at great cost and must be protected and used judiciously.

e Some damage to crops can be avoided by a small organizational effort by the users in both seasons. The committees of the co-operatives, and the members, must observe the rules of water management and structure maintenance.

f Although farmers may not find water rotation attractive during the wet season, it has nevertheless many advantages. The studies have revealed a frequent tendency to allow continuous flow during the wet season. One result is that plots in the areas with drainage difficulties experience waterlogging. Continuous flow also inhibits maintenance. A flexible rotation would overcome problems arising from fragmentation of the available flows, which penalizes tail-enders.

5 AGRONOMIC SITUATION

Conclusions :

a The farmer's strategy, based on food self-sufficiency and risk minimization, involves pursuing numerous activities in parallel. The labor demands of irrigation, the insufficient labor resource, and the low level of farm equipment make it difficult to co-ordinate these activities, and lead **to** bottle-necks, and to poor execution of some agricultural operations.

b Irrigation at the plot level is especially sensitive to soil preparation. Bad land-levelling creates unfavorable hydraulic conditions, and hence yield reduction. Training of farmers in land preparation appears necessary. [1]

c The overall yield level is not bad, but there is room for improvement through observing **a** minimum of procedures for water management and cultivation practices.

d Organization is often poor in the dry season, especially as regards horticultural crops.

Recommendations :

a It would be interesting to study the possibility of attaching one or two permanent organizers to the irrigated areas. In the context of State disengagement, the farmers' organizations must gradually take responsibility for the services of the organizers.

b The training of organizers must be continuous, and adapted to the training needs of farmers. It should deal with water management, and also with horticul'tural crops. Training should aim at facilitating organization of farmers in order to :

i perform better land preparation, especially levelling

ii make farmers aware of the advantages of using selected seeds, of standards for nursery and transplantation techniques, and observance **of** cropping calendars

iii ensure correct crop management (for both rice and horticulture), use of chemical and organic fertilizers, weeding, and pest and disease control.

iv improve field-level water management through effective farmers' organization.

c Training, both of organizers and of farmers, should emphasize planning and monitoring. The difficulty of observance of the cropping schedule arises (among other reasons) because of the priority accorded to rainfed crops.

d Regarding input supply, stocking by the co-operatives, in response to demands expressed by users, could solve the observed deficiency in the wet season, and the virtual non-existence of inputs in the dry season. Funds could be provided by the co-operative committees, to create these stocks and provide inputs with minimum delay.

e The shortage of selected seeds could be dealt with by creating seed multiplication centres, for rice and horticultural crops, at either national, regional or local level

f Monitoring of soil conditions should be done periodically, by the relevant national services, to give prior warning of any physio-che'mical deterioration of soils.

6 OVERALL RECOMMENDATIONS *AND* FUTURE DIRECTIONS OF THE PROJECT

6.1 Objectives of irrigation

6.1.a Sharpen the criteria that distinguish social and economic irrigation, and define the threshold between these two classes. This socio-economic approach has not been sufficient during the first phase of the project. It can be implemented on three of the project sites (Dakiri, Itenga, and Mogtédo) and on a large sample of farmers.

6.1.b Extend this socio-economic approach, in simplified form, to a much larger set of systems

6.2 Organizational framework

6.2.a The project can contribute to harmonizing and correcting the inadequacies of the legal texts, both general and specific, which govern the operations of irrigation systems. This harmonization ought initially to deal with :

land allocation
issuing of titles to land;
fixing of conditions for use, management, maintenance and extension of systems;
determining irrigation fees and other taxes.

6.2.b The disengagement of the State from direct management of irrigation facilities must be accompanied by clear division of responsibilities between the State, the farmers' organizations and the individual farmers.

6.2.c A Technical Audit, aimed at monitoring and controlling good maintenance and system management, can be instituted and regularly carried out.

6.3 LAND TENURE IN IRRIGATION SYSTEMS

6.3.a The conditions for success of the State disengagement policy depend on full application of the opportunities offered by the land reform law of 1991. This permits a new range of solutions, including :

i allocation of land to:
individuals;
legal entities, public or private;
societies or organizations.

ii tenure of land under :
occupancy permit
exploitation permit
leasehold
freehold

6.3.b This change permits the testing, in pilot projects, of different forms of organization and of land allocation. The project (PMI-BF) could participate in identification and development of pilot projects for studying the performance consequences of these different land-management combinations.

6.4 WATER MANAGEMENT

6.4.a The project has found that irrigation water deliveries are between 10,000 and 12,000 m^3/ha in the wet season. The project will develop and propose a cropping calendar which uses rainfall better, enabling substantial water savings and increase of crop intensity.

6.4.b Optimizing the productivity of water will depend on seasonal crop planning and on a rational program of water management. This implies availability of reliable facilities for data-gathering and for monitoring of management activities. These data can also be used in evaluation of system performance. The project will continue to equip reservoirs and irrigation systems with measuring devices and will continue to train those who have monitoring duties. To ensure effective use of the data, the collaboration of the regional and provincial technical services will be sought.

6.4.a The project will pursue, with its partners, the monitoring of water consumption in order to compare actual consumption with theoretical water requirements. So far, the study of water requirements has addressed only evaportranspiration and percolation. For completeness, water used in land preparation must be studied.

6.5 AGRONOMIC SITUATION

6.5.a The project will take greater interest in the farmers' total production systems, to understand better their logic and decision-making, with a view to mitigating the effects of competition between irrigated agriculture and other activities, especially rainfed agriculture.

6.5.b The training of the organizers should be continual and tailored to the farmers' needs. It should address field water management, and agronomy of horticultural crops. It must also stress seasonal planning and monitoring.

6.5.c The establishment of stocks of inputs by the co-operatives, according to users' expressed demands, could solve the problem of input deficiencies observed in the wet season, and virtual non-availability of inputs in the dry season. The co-operative committees should study ways of mobilizing the necessary funds to implement this initiative.

6.5.d The shortage of selected seeds can be reduced by establishing seed multiplication centres for rice and horticultural crops either at national, regional or local level. Some small irrigation systems might be dedicated to this purpose in future. Demonstrations about seed production, good cultivation practices, composting, and soil conservation could be undertaken as part of the farmers' training.

6.6 In summary, the project can, in the next two years :

* finalize a simplified assessment methodology, emphasizing performance evaluation in terms of objectives;

* develop and test indicators of system performance for use in system monitoring and evaluation;

* choose one or more systems, either among those already studied or new ones, which can serve as pilot project sites for testing different institutional approaches and different land tenure systems.

ANNEX 4

Summary of principal performance data so far obtained at the five sites

	DAKIRI	MOGTEDO	SAVILI	ITENGA	GORGO
GROSS PRODUCT VALUE (FCFA) PER ARE/YEAR	8 125	10 555	7 136	7 018	4 252
CROPPING INTENSITY	2.00	1.49	1.00	1.41	1.00
COSTS OF PRODUCTION (FCFA/ARE/Y)	8 375	2 734	2 112	2 168	1 148
NET PRODUCT VALUE (FCFA/ARE/Y)	6 750	7 820	5 024	4 850	3 104
LABOR INPUT (DAYS/ARE/Y)	6.56	5.73	5.00	5.33	3.28
NET LABOR PRODUCTIVITY (FCFA/DAY)	1 030	1 356	1 005	910	945
WATER ISSUED FROM RESERVOIR (MM/WET SEASON)	N.A	N.A	N.A	1 200	1 207
GROSS WATER PRODUCTIVITY (FCFA/M³)	N.A	N.A	N.A	36.1	35.6
NET WATER PRODUCTIVITY (FCFA/M³)	N.A	N.A	N.A	24.9	26.0
GROSS PRODUCTION, FCFA PER M³ OF WATER STORAGE	8.70	19.79	13.15	13.48	15.75
NET PRODUCTION FCFA PER M³ OF WATER STORAGE	7.23	14.66	9.26	9.32	11.50

Most of the above data refer to 1991/92, except Savili 1990/91 and Gorgo 1992/93.

Significant items on which data are not at present available include:

Annual expenditure by government, FCFA/are
Fee collection by co-operatives, FCFA/are
Fee collection percentage