

Document of
The World Bank

Report No: ICR00003487

IMPLEMENTATION COMPLETION AND RESULTS REPORT
(IDA-42440 TF-93651)

ON A

CREDIT

IN THE AMOUNT OF SDR20.2 MILLION
(US\$30 MILLION EQUIVALENT)

AND A

GLOBAL ENVIRONMENTAL FACILITY GRANT

IN THE AMOUNT OF US\$5.90 MILLION

TO THE

REPUBLIC OF MADAGASCAR

FOR THE

IRRIGATION AND WATERSHED MANAGEMENT PROJECT

June 24, 2015

Agriculture Global Practice
Country Department AFCS4
Africa Region

CURRENCY EQUIVALENTS

(Exchange Rate Effective May 1, 2015)

Currency Unit = Malagasy Ariary (Ar)
US\$ 1.00 = Ar 3,100.00

FISCAL YEAR

January 1 – December 31

ABBREVIATIONS AND ACRONYMS

AFD	<i>Agence Française de Développement</i> (French Development Agency)
APL	Adaptable Program Loan
ASC	Agricultural Service Center
BV	<i>Bassin Versant</i> (watershed)
CAS	Country Assistance Strategy
CeICo	<i>Cellule de Coordination</i> (IWMP implementation unit)
COGE	<i>Comité de Gestion</i> (sub-watershed management committee)
DRDR	<i>Direction Régionale du Développement Rural</i> (Regional Directorate for Rural Development)
ERR	Economic Rate of Return
EU	European Union
FERHA	<i>Fonds d'Entretien des Réseaux Hydro-Agricoles</i> (Irrigation Scheme Maintenance Fund)
GEF	Global Environment Facility
GEO	Global Environment Objective
GER	<i>Gros Entretien et Renouvellement</i> (major repairs and replacement)
GGDT	<i>Groupeement de Gestion Durable des Terres</i> (sustainable land management association)
GoM	Government of Madagascar
ICR	Implementation Completion and Results Report
IDA	International Development Association
ISR	Implementation Status and Results
IWMP	Irrigation and Watershed Management Project
KFW	German Federal Government Development Bank
MAP	Madagascar Action Plan
MAPER	<i>Montant d'Apport Préalable Estimé Réaliste</i> (upfront contribution considered realistic)
MINAGRI	<i>Ministère de l'Agriculture et du Développement Rural</i> (Ministry of Agriculture and Rural Development)
M&E	Monitoring and Evaluation
MTR	Mid-Term Review
NIWMP	National Irrigation and Watershed Management Program (<i>Programme National Bassins Versants - Périmètres Irrigués</i>)

NPV	Net Present Value
NRDP	National Rural Development Program
O&M	Operation and Maintenance
OP	Organization of Producers
PAD	Project Appraisal Document
PARECAM	<i>Projet d'Appui à la Résilience aux Crises Alimentaires à Madagascar</i> (Food Crisis Resilience Support Project, EU funded)
PC	Performance Contract
PDO	Project Development Objective
PHRD	Policy and Human Resources Development project
PIU	Project Implementation Unit
PLAE	<i>Programme de Lutte Anti-Erosive</i> (Anti-Erosion Program, KFW funded)
PLOF	<i>Plan Local d'Occupation Foncière</i> (PLOF, communal land use plan)
PPF	Project Preparation Facility
PPP	Public-Private Partnership
PRSP	Poverty Reduction Strategy Paper
PUPIRV	<i>Projet d'Urgence pour la Préservation des Infrastructures et la Réduction de la Vulnérabilité</i> (Emergency Infrastructure Preservation and Vulnerability Reduction Project)
PURSAPS	<i>Projet d'Urgence pour la Sécurité Alimentaire et la Protection Sociale</i> (Emergency Food Security and Social Protection Project)
SAC	<i>Schéma d'Aménagement Communal</i> (communal development plan)
SDP	Scheme Development Plan
SIL	Sector Investment Loan
SLM	Sustainable Land Management
SP	Strategic Partner
SRA	<i>Système de Riziculture Améliorée</i> (improved rice cultivation system)
SRI	<i>Système de Riziculture Intensive</i> (intensive rice cultivation system)
TA	Technical Assistance / Technical Assistant
VAT	Value Added Tax
VCR	Value-Cost Ratio
WDP	Watershed Development Plan
WMP	Watershed Master Plan
WUA	Water User Association

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REPUBLIC OF MADAGASCAR
Irrigation and Watershed Management Project

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A. Basic Information			
Country:	Madagascar	Project Name:	Irrigation and Watershed Management Project
Project ID:	P074086,P088887	L/C/TF Number(s):	IDA-42440,TF-93651
ICR Date:	05/26/2015	ICR Type:	Core ICR
Lending Instrument:	APL,SIL	Borrower:	GOVERNMENT OF MADAGASCAR
Original Total Commitment:	XDR 20.20M,USD 5.90M	Disbursed Amount:	XDR 19.61M,USD 5.25M
Environmental Category: A,A		Focal Area: M	
Implementing Agencies: Ministry of Agriculture, Livestock and Fisheries Ministère de l'Agriculture, de l'Élevage et de la Pêche			
Cofinanciers and Other External Partners:			

B. Key Dates				
Irrigation and Watershed Management Project - P074086				
Process	Date	Process	Original Date	Revised / Actual Date(s)
Concept Review:	06/28/2004	Effectiveness:	04/30/2007	04/30/2007
Appraisal:	06/12/2006	Restructuring(s):		02/28/2011 09/18/2012 05/15/2014
Approval:	11/14/2006	Mid-term Review:	09/19/2011	09/19/2011
		Closing:	03/01/2011	12/31/2014

Irrigation & Watershed Management Project - GEF - P088887				
Process	Date	Process	Original Date	Revised / Actual Date(s)
Concept Review:	06/28/2004	Effectiveness:		
Appraisal:	06/12/2006	Restructuring(s):		
Approval:	11/06/2008	Mid-term Review:		
		Closing:	06/30/2014	06/30/2014

C. Ratings Summary	
C.1 Performance Rating by ICR	
Outcomes	Moderately Unsatisfactory
GEO Outcomes	Moderately Unsatisfactory
Risk to Development Outcome	High

Risk to GEO Outcome	High
Bank Performance	Moderately Unsatisfactory
Borrower Performance	Moderately Satisfactory

C.2 Detailed Ratings of Bank and Borrower Performance (by ICR)

Bank	Ratings	Borrower	Ratings
Quality at Entry	Moderately Unsatisfactory	Government:	Moderately Satisfactory
Quality of Supervision:	Moderately Unsatisfactory	Implementing Agency/Agencies:	Moderately Satisfactory
Overall Bank Performance	Moderately Unsatisfactory	Overall Borrower Performance	Moderately Satisfactory

C.3 Quality at Entry and Implementation Performance Indicators

Irrigation and Watershed Management Project - P074086			
Implementation Performance	Indicators	QAG Assessments (if any)	Rating:
Potential Problem Project at any time (Yes/No):	No	Quality at Entry (QEA)	None
Problem Project at any time (Yes/No):	Yes	Quality of Supervision (QSA)	None
DO rating before Closing/Inactive status	Satisfactory		

Irrigation & Watershed Management Project - GEF - P088887			
Implementation Performance	Indicators	QAG Assessments (if any)	Rating:
Potential Problem Project at any time (Yes/No):	No	Quality at Entry (QEA)	None
Problem Project at any time (Yes/No):	No	Quality of Supervision (QSA)	None
GEO rating before Closing/Inactive Status	Moderately Satisfactory		

D. Sector and Theme Codes

Irrigation and Watershed Management Project - P074086		
	Original	Actual
Sector Code (as % of total Bank financing)		
Agricultural extension and research		10
Agro-industry, marketing, and trade	10	
Crops	15	13

Forestry		14
General agriculture, fishing and forestry sector	20	31
General public administration sector	25	
Irrigation and drainage	30	32
Theme Code (as % of total Bank financing)		
Land administration and management		5
Other rural development	13	15
Rural markets	25	
Rural policies and institutions	13	30
Rural services and infrastructure	25	40
Water resource management	24	10

Irrigation & Watershed Management Project - GEF - P088887		
	Original	Actual
Sector Code (as % of total Bank financing)		
Agricultural extension and research	17	10
Agro-industry, marketing, and trade	3	
Crops		13
Forestry		14
General agriculture, fishing and forestry sector	23	31
Irrigation and drainage	41	32
Public administration- Agriculture, fishing and forestry	16	
Theme Code (as % of total Bank financing)		
Land administration and management	15	5
Other rural development		15
Rural markets	30	
Rural policies and institutions		30
Rural services and infrastructure	25	40
Water resource management	30	10

E. Bank Staff		
Irrigation and Watershed Management Project - P074086		
Positions	At ICR	At Approval
Vice President:	Makhtar Diop	Gobind T. Nankani
Country Director:	Mark R. Lundell	James P. Bond
Practice Manager/Manager:	Severin L. Kodderitzsch	John McIntire
Project Team Leader:	Ziva Razafintsalama	IJsbrand Harko de Jong
ICR Team Leader:	Francois Onimus	
ICR Primary Author:	Joel Hourticq	

Irrigation & Watershed Management Project - GEF - P088887		
Positions	At ICR	At Approval
Vice President:	Makhtar Diop	Obiageli Katryn Ezekwesili
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Project Team Leader:	Ziva Razafintsalama	Ziva Razafintsalama
ICR Team Leader:	Francois Onimus	
ICR Primary Author:	Joel Hourticq	

F. Results Framework Analysis

Project Development Objectives (from Project Appraisal Document)

The development objective of the project is to establish a viable basis for irrigated agriculture and natural resources management in four main irrigation sites and their surrounding watersheds.

Revised Project Development Objectives (as approved by original approving authority)

Global Environment Objectives (from Project Appraisal Document)

The Global Environment Objective of the project is to improve the environmental sustainability of land management practices in four targeted watersheds.

Revised Global Environment Objectives (as approved by original approving authority)

(a) **PDO Indicator(s)**

(b) **GEO Indicator(s)**

Indicator	Baseline Value	Original Target Values (from approval documents)	Formally Revised Target Values	Actual Value Achieved at Completion or Target Years
Indicator 1 :	Area cultivated with improved technologies and/or inputs provided through the Project (ha)			
Value (quantitative or Qualitative)	0	4050	5175	6122
Date achieved	02/24/2011	02/24/2011	12/31/2014	12/31/2014
Comments (incl. % achievement)	This target was introduced through the February 2011 restructuring (restructuring date shown as baseline). Achievement was 118% of the target.			
Indicator 2 :	Area provided with improved irrigation and drainage services by the Project (ha)			
Value (quantitative or Qualitative)	0	21780	13362	7500
Date achieved	11/15/2006	03/01/2011	12/31/2014	12/31/2014
Comments (incl. % achievement)	56% compared to revised target. The achievement value does not reflect the project reports and was independently established by the ICR team as described in Annex 2 of the ICRR			
Indicator 3 :	Area cultivated during the dry season in the irrigation schemes targeted by the Project (ha)			
Value (quantitative or Qualitative)	1120	3000	4150	Not measured
Date achieved	02/24/2011	12/31/2012	12/31/2014	12/31/2014
Comments (incl. % achievement)	After diversification efforts were discontinued, this indicator lost its relevance.			
Indicator 4 :	Direct Project beneficiaries (number)			
Value (quantitative or Qualitative)	0	30000	13130	15725
Date achieved	11/15/2006	03/01/2011	12/31/2014	12/31/2014
Comments (incl. % achievement)	120% achievement against revised target. The achievement value does not reflect the project reports and was independently established by the ICR team as described in Annex 2 of the ICRR.			
Indicator 5 :	Of which female (%)			
Value (quantitative or Qualitative)	0	Not applicable	20	44
Date achieved	11/15/2006	03/01/2011	12/31/2014	12/31/2014
Comments (incl. % achievement)	220% achievement			

(b) GEO Indicator(s)

Indicator	Baseline Value	Original Target Values (from approval documents)	Formally Revised Target Values	Actual Value Achieved at Completion or Target Years
Indicator 1 :	Area under sustainable land management practices in Project intervention zones (ha)			
Value (quantitative or Qualitative)	0	20%	2051	3018
Date achieved	11/15/2006	03/01/2011	12/31/2014	12/31/2014
Comments (incl. % achievement)	The PAD target was 20% of baseline (which was not established). The first restructuring established a target of 5,100 hectares which was subsequently reduced to 2,051 hectares. 147% achievement of the final revised target.			

(c) Intermediate Outcome Indicator(s)

Indicator	Baseline Value	Original Target Values (from approval documents)	Formally Revised Target Values	Actual Value Achieved at Completion or Target Years
Indicator 1 :	Ag Service Centers established and functioning (number)			
Value (quantitative or Qualitative)	0	5		5
Date achieved	11/15/2006	11/06/2008		03/01/2011
Comments (incl. % achievement)	100% achieved, but with limited impact from Ag Service Centers in linking farmers to suppliers and service providers. See Annex 2 for details.			
Indicator 2 :	Clients who have adopted an improved agricultural technology promoted by the project (number)			
Value (quantitative or Qualitative)	0	14810	32130	5900 to 9100
Date achieved	11/15/2006	12/31/2012	12/31/2014	12/31/2014
Comments (incl. % achievement)	Achievement rate is 20 to 30 percent. Actual achievement was independently calculated by the ICR team (see Annex 2).			
Indicator 3 :	Sub-projects financed and implemented (number)			
Value (quantitative or Qualitative)	0	1554	1560	1935
Date achieved	02/24/2011	12/31/2012	12/31/2014	12/31/2014
Comments (incl. % achievement)	124 % achievement			
Indicator 4 :	Technologies demonstrated by the project (number)			

Value (quantitative or Qualitative)	0	9	6	8
Date achieved	02/24/2011	12/31/2012	12/31/2014	12/31/2014
Comments (incl. % achievement)	133% achieved			
Indicator 5 :	Water users provided with improved irrigation and drainage services (number)			
Value (quantitative or Qualitative)	0	10117	20278	8300
Date achieved	02/24/2011	12/31/2012	12/31/2014	12/31/2014
Comments (incl. % achievement)	Actual value adjusted in this ICR based on an average of 0.9 ha per farmer for the four project sites and on area with improved irrigation and drainage service of 7,500 ha (see Annex 2 for details) leading to 40% achievement rate.			
Indicator 6 :	Operational WUAs (number)			
Value (quantitative or Qualitative)	0	60	78	88
Date achieved	02/24/2011	12/31/2012	12/31/2014	12/31/2014
Comments (incl. % achievement)	113% of revised target achieved			
Indicator 7 :	O&M covered with collected fees (million Ar)			
Value (quantitative or Qualitative)	about 10%	100%	540	284
Date achieved	11/15/2006	03/01/2011	12/31/2014	12/31/2014
Comments (incl. % achievement)	The PAD had set a target of 100% collection of the amount indicated in the Performance Contract. This was transformed into an absolute target of Ar540 million. Actual achievement is 53% of the revised target (after correcting the final ISR figure).			
Indicator 8 :	FERHA (Agency for irrigation infrastructure management) operational in one region (yes/no)			
Value (quantitative or Qualitative)	No	Yes	Yes	No
Date achieved	11/15/2006	12/31/2010	12/31/2013	12/31/2014
Comments (incl. % achievement)	FERHA not established but the new Law 14-042 that in particular provides for the establishment of FERHA at national and regional levels was promulgated in January 2015.			
Indicator 9 :	Watershed Development Plans developed (number)			
Value (quantitative or Qualitative)	0	4		4
Date achieved	11/15/2006	03/01/2011		12/31/2014
Comments (incl. % achievement)	100% achieved			

Indicator 10 :	Sub-watershed management plans developed and signed (number)			
Value (quantitative or Qualitative)	0	8	13	17
Date achieved	11/15/2006	03/01/2011	12/31/2012	12/31/2014
Comments (incl. % achievement)	130% achieved			
Indicator 11 :	Beneficiaries adopting SLM (number)			
Value (quantitative or Qualitative)	0	2300	2400	1425
Date achieved	02/24/2011	12/31/2012	12/31/2014	12/31/2014
Comments (incl. % achievement)	Actual value was overestimated in last ISR. Real value is not known but was estimated in this ICR to take into account SLM adoption only (see Annex 2). This represents a 59% achievement rate.			
Indicator 12 :	Anti-erosion (mechanical) measures implemented (number)			
Value (quantitative or Qualitative)	0	145	64	117
Date achieved	11/15/2006	03/01/2011	06/30/2014	12/31/2014
Comments (incl. % achievement)	81% of original target value and 183% of revised target value achieved			
Indicator 13 :	Reforestation success rate			
Value (quantitative or Qualitative)	N/A	80%		79%
Date achieved	02/24/2011	02/24/2011		12/31/2014
Comments (incl. % achievement)	99% achieved at end of project but with serious issues regarding long term management of the forested areas (see Annex 2).			
Indicator 14 :	Operational guichets fonciers			
Value (quantitative or Qualitative)	0	5	5	5
Date achieved	11/15/2006	03/01/2011	12/31/2012	12/31/2014
Comments (incl. % achievement)	100% achieved but with serious issues regarding medium term functioning of the guichets fonciers (see Annex 2)			

G. Ratings of Project Performance in ISRs

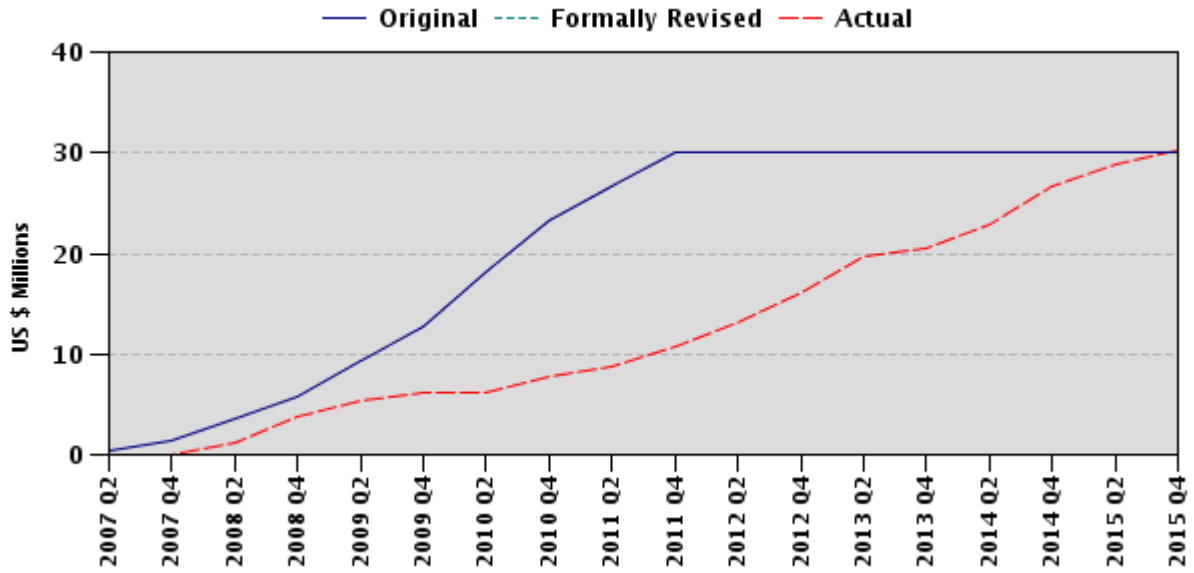
-						
No.	Date ISR Archived	DO	GEO	IP	Actual Disbursements (USD millions)	
					Project 1	Project 2
1	12/22/2006	S		S	0.00	0.00
2	06/29/2007	S		S	0.00	0.00
3	11/30/2007	S		S	1.25	0.00
4	06/20/2008	S		S	3.06	0.00
5	12/12/2008	MS	S	MS	5.32	0.00
6	05/30/2009	MS	S	MS	6.12	0.00
7	12/14/2009	MU	MU	MS	6.12	0.00
8	06/10/2010	MU	MU	MS	6.12	0.00
9	11/04/2010	MU	MU	MS	8.57	0.00
10	03/01/2011	MS		MS	9.21	0.00
11	10/07/2011	MS	MS	MS	11.38	0.00
12	06/11/2012	MS	MS	MS	16.06	0.00
13	03/31/2013	MS	MS	MS	20.06	1.08
14	11/27/2013	S	MS	MS	22.29	3.02
15	05/13/2014	S	MS	MS	25.37	4.93
16	12/01/2014	S	MS	MS	28.80	5.25
17	12/22/2014	S	MS	MS	28.80	5.25

H. Restructuring (if any)

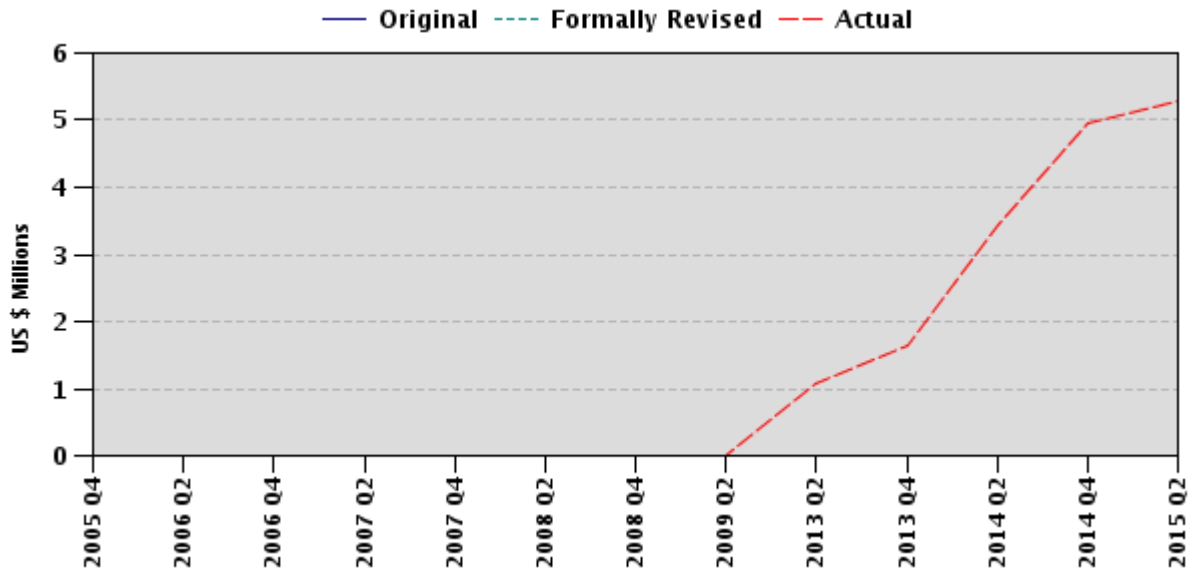
Restructuring Date(s)	Board Approved		ISR Ratings at Restructuring			Amount Disbursed at Restructuring in USD millions		Reason for Restructuring & Key Changes Made
	PDO Change	GEO Change	DO	GEO	IP	Project1	Project 2	
02/28/2011			MU		MS	9.21		Extension of closing date and reallocation of credit proceeds Modification of Performance Indicators
09/18/2012			MS		MS	17.79		Second Extension of closing date and reallocation of credit proceeds
05/15/2014			S		MS	25.37		Third extension of closing date

I. Disbursement Profile

P074086



P088887



1. Project Context, Development Objectives and Design

1.1 Context at Appraisal

Country Context

1. Madagascar was one of the poorest countries in the world at the time of appraisal and remains so at closing, with per capita GDP of about US\$281 in 2006 and US\$271 in 2013 (both figures in constant 2005 US\$). The economy continues to be basically rural, with rural population representing 66 percent of total population and agriculture accounting for 26 percent of GDP in 2013 (respectively 71 and 28 percent at appraisal in 2006). Poverty headcount ratios have also remained largely unchanged throughout the project life: the poor were estimated to represent 75 percent of total population and 82 percent of rural population in 2010, against 75 and 81 percent in 2005.¹

2. After contested presidential elections in 2001-2002 that led to the collapse of the economy and the discontinuation of many public social services, Madagascar was experiencing some political stability at the time the project was being appraised. The Government of Madagascar (GoM) strategy was embodied in the Poverty Reduction Strategy Paper (PRSP, July 2003), which had the objective to reduce poverty by half in ten years. In agriculture, the PRSP aimed at “ensuring food security and making optimal use of resources” through, inter alia, increased agricultural productivity and cultivated areas (about one-half of Madagascar’s land area is cultivable, but little more than 5 percent was - and still is - under temporary and permanent crops). The GoM was also in the process of finalizing its second-generation strategy, the Madagascar Action Plan 2012 (MAP) that was a direct follow-on from the PRSP and assigned renewed priority to rural and agricultural development. A significant growth potential, yet to be reaped, was rightly identified in a number of sectors, including mining, construction, tourism and, most important for the poor, agriculture.

Sector Context

3. At appraisal, about 40 percent of arable land, about 1.1 million hectares, was under irrigation in both traditional and more developed schemes.² Again, this proportion remains unchanged as of 2015. Rice, about 90 percent of which was irrigated, was the main staple crop, accounting for about 40 percent of total gross agricultural production value and 50 percent of total calorie consumption. In 2006, it was noted that annual production of paddy had virtually stagnated over the previous ten years, stabilizing between 2.3 and 3.0 million tons, while imports of rice had increased from an average of 52,000 tons (equivalent to about 78,000 tons of paddy) per year in the 1990s to an average of 195,000 tons (equivalent to about 291,000 tons of paddy) per year in the first six years of the 2000s. Area planted to paddy had increased by only 0.4 percent per year from 1970 to 2004. Yields had increased by 0.7 percent per year over

¹ All figures in this section are from the Project Appraisal Document (PAD, World Bank 2006), <http://data.worldbank.org/>, March 2015 and <http://faostat.fao.org/>, March 2015.

² Versus 6 percent on average in Africa.

the same period, much slower than in other major rice producing countries, and were remaining low, averaging about 2.6 tons per hectare at the national level.

4. The disappointing performance of the agriculture sector in previous years, despite the liberalization of the economy, the sharp devaluation of the exchange rate, and the privatization of state enterprises, was seen as a major cause of the deep poverty in rural areas and was explained by at least six factors: (i) Farming systems were still very traditional, with two-thirds of all rural households living at subsistence level and very low yields; (ii) Weak infrastructure was hampering the transport of produce, whether for export or for the domestic market; (iii) Agricultural productivity was hampered by poor access to agricultural technology, inputs, and agricultural services; (iv) In particular, extension services were all but lacking, having failed to have a significant impact on productivity levels due to a bias towards technical messages, a too centralized approach leaving little room to accommodate regional variations, inadequate consideration for the economic constraints farmers were facing, insufficient capacities and unrealistic expectations about the volume of public (human and financial) resources available; (v) Only 1.5 percent of Madagascar's small farmers had access to credit, and just 5 percent of total lending was going to agriculture; and (vi) Traditional land tenure systems were not providing farmers with sufficient security.

5. At the end of 2005, the GoM adopted a National Rural Development Program (NRDP) which was centered around five strategic axes: (i) to make the institutional framework more effective by completing public administration reform and decentralization; (ii) to facilitate access to capital and production factors; (iii) to improve food security and production through increased productivity, diversification, and risk management; (iv) to promote better natural resources management; and (v) to develop markets and promote a value chain approach by encouraging public-private partnerships.

6. Since the 1950s, irrigation had benefited from public investment. However, the impact of these investments on rural incomes was mixed, and their sustainability was far from certain. The rapid degradation of infrastructure required frequent rehabilitation, and many schemes were caught in a vicious circle of poor yields and limited ability on the part of water users to pay for operation and maintenance (O&M). This inability to pay was compounded by low willingness to pay, and reinforced by the institutional weakness of Water Users' Associations (WUA), as well as a lack of support from local authorities. The erosion of upstream watersheds was moreover weighing heavily on the costs of maintaining downstream irrigation schemes.

7. At the time of appraisal in 2006, a clear consensus was therefore emerging regarding the need to adopt a new approach to the development of irrigation in Madagascar. The need for a broader and more inclusive strategy of agricultural intensification that would reach beyond the rehabilitation of infrastructure and extend to promoting a more integrated and participatory approach had been emphasized in a number of recent studies.³ Such an approach would include: (i) promotion of green revolution and *agro-ecological* technologies in order to boost productivity; (ii) enhanced access to finance, inputs, equipment, and markets; (iii) establishment of an appropriate incentive and financing framework for efficient O&M of irrigation infrastructure; (iv) financial mechanisms to mitigate the damages caused by the

³ See references in PAD (World Bank 2006).

frequent cyclones that affect the country; and (v) soil and water conservation in upper watersheds.

8. These lessons and the need to adopt a long-term, comprehensive approach to irrigation development were fully reflected in the GoM's new *Lettre de Politique de Développement des Bassins Versants et Périmètres Irrigués* (Irrigation and Watershed Management Policy Letter) that was issued in 2006 and operationalized through the establishment of the National Irrigation and Watershed Management Program (NIWMP) the same year.⁴ The Irrigation and Watershed Management Project (IWMP), appraised in 2006, was therefore fully consistent with the principles underpinning the NRDP and in line with the GoM's new irrigation and watershed management strategy.

Rationale for Bank Involvement

9. The Country Assistance Strategy (CAS) for Madagascar at the time of appraisal was designed to support the implementation of the PRSP. For this purpose, the CAS was organized around three key priorities: (i) improve governance; (ii) promote broad based growth; and (iii) provide human security. The IWMP was to contribute to the second priority.

10. In addition to being seen as the lead GoM partner for poverty reduction, the Bank had a comparative advantage in funding the IWMP due to its active role in the support of reforms in the irrigation sector since the early 1990s. Specifically, the privatization of public and parastatal irrigation organizations, the rationalization of public expenditures for maintenance, the transfer of the management of irrigation schemes to WUAs, and capacity building had been supported by past Bank investment operations. More recently, the Bank had supported the GoM in establishing the Irrigation Scheme Maintenance Fund or *Fonds d'Entretien des Réseaux Hydro-Agricoles* (FERHA).

11. By promoting sustainable land management across the watersheds, the project was also consistent with the GEF Operational Program 15 concerning the mitigation and prevention of land degradation. Because Madagascar was eligible for GEF support, it was decided the project would be co-financed by IDA (US\$30.0 million) and GEF (US\$ 6.0 million), on a fully blended basis.

1.2 Original Project Development Objectives and Key Indicators (as approved)

12. The IWMP was conceived as the first phase of a three phase, 12 year program to be financed through an Adaptable Program Loan (APL). The APL program objective was “*to sustainably improve the living conditions and incomes of rural populations in six main irrigation sites and their surrounding watersheds, and the management of natural resources.*” The program objective was to be measured by four indicators related to (i) the productivity of irrigated and of rainfed rice in project areas (both in mt/ha) as a measure of the increased intensification resulting from the improved water management and expanded use of the crop

⁴ MINAGRI 2006a and MINAGRI 2006b.

intensification packages; (ii) the non-rice irrigated area as a measure of the increase diversification of the cropping pattern which was considered a condition for sustainable improvement of incomes in a context of ever decreasing size of the farms; and (iii) the area under production in irrigated areas during the dry season, which is another dimension of crop intensification.

13. In the context of the broader APL objective described above, the Project Development Objective (PDO) of the APL first phase (the IWMP) was “*to establish a viable basis for irrigated agriculture and natural resources management in four main irrigation sites and their surrounding watersheds: (i) Andapa (Sava Region), (ii) Marovoay (Boeny Region), (iii) Itasy Region, and (iv) Lac Alaotra (Alaotra Mangoro Region)*” and the Global Environment Objective (GEO) was “*to improve the environmental sustainability of land management practices in four targeted watersheds.*” The project outcome was to be measured against the dissemination of innovative technologies (number of people), the area under improved water management (hectares), the number of sub watersheds under improved management and the increased public expenditures for agricultural intensification, and for the global environment objective the increase in vegetation cover and in the area under sustainable land management practices.

14. Triggers for moving to the second phase of the APL included attainment of the following targets:

- Watershed Master Plans (WMP, including Scheme Development Plans – SDPs - and Watershed Development Plans - WDPs) and associated Performance Contracts executed satisfactorily;
- an acceptable institutional mechanism for the funding of non-transferable irrigation infrastructure established and operational (FERHA);
- private sector investments in agriculture increased as evidenced by disbursements under the matching grant mechanism;
- Agricultural Service Centers (ASCs) established and operational in the four project sites;
- *guichets fonciers* established and operational in the four project sites.

1.3 Revised PDO (as approved by original approving authority) and Key Indicators, and Reasons/justification

15. The APL program objective and the PDO/GEO remained unchanged throughout the project life. However, most key performance indicators were adjusted, and some of them dropped, during the first two project restructurings that took place in 2011 and 2012.⁵ When the project was restructured for the first time in February 2011, baseline values that were not precisely known at appraisal were corrected and the definitions of several indicators were revised to facilitate measurement and allow better assessment of project achievements, while

⁵ A third restructuring was approved in 2014 to grant a six month extension exclusive of any other change. See further below.

the target values of some indicators were reduced to take into account the non-availability of GEF funds (see section 2.2). Three project outcome indicators were dropped: the indicator related to improved management of eight watersheds; the indicator related to increased public expenditure; and the indicator related to increase in vegetation cover.⁶ When the project was restructured for the second time in August 2012 after the signing of the GEF Grant Agreement, the end-of-project targets were modified again, maintaining the definitional changes made in February 2011. According to the Restructuring Paper, the target values were mostly restored to their original value, though adjusted to reflect that GEF resources did not finance irrigation-related activities and rice intensification sub-projects that used chemical fertilizers. In addition, some indicators were highlighted as core.

Table 1 : Program and project indicators as revised at project restructurings (2011 and 2012)

Original indicators	Target value	Revised indicator	Target value	Revised target value
Program level indicators				
Increased average productivity of irrigated rice in the project areas (mt/ha)	4.3	REFORMULATED: Average yield of irrigated rice in project-rehabilitated irrigation sites in the main season	4.3	4.4
Increased average productivity of rainfed rice in project areas (mt/ha)	2.25	REFORMULATED: Average yield of rainfed rice in surrounding watersheds	2.4	2.6
Increase in non-rice area in irrigated schemes as a percentage of overall cultivated area over two seasons (%)	25	CHANGED: Average yield of non-rice crops supported by the project (mt/ha)	Maize: 1.2 Beans: 0.5 Etc.	Maize: 1.7 Beans: 0.8 Etc.
Increase in area under production in irrigated schemes during the dry season (%)	25	DROPPED But reintroduced as PDO indicator below	n/a	n/a
		NEW: Average value of the additional rice production in project-rehabilitated irrigation sites for rainy and dry seasons (10 ⁶ Ar/beneficiary/cycle)	0.480 0.620	0.872 0.511

⁶ Although the reasons for dropping these indicators are not spelt out in the Restructuring Paper, we can assume that the reasons were the lack of precise definition for the first one (number of improved watersheds) and the fact that the indicator was not attributable to the project for the second one (increased public expenditure). There is however no obvious reason for dropping the third one related to vegetation cover.

Table 1 (cont.): Program and project indicators as revised at project restructurings (2011 and 2012)

Original indicators	Target value	Revised indicator	Target value	Revised target value
Project outcome indicators				
Dissemination of innovative technologies and equipment to 30,000 beneficiaries through extension, capacity strengthening and targeted cost sharing (nb)	30,000	CHANGED: Area cultivated with improved technologies and/or inputs provided through the project (ha)	5,175	6,122
Improved management of about 21,780 ha through investments in rehabilitation, training and institutional reforms (ha)	21,780	REFORMULATED: Area provided with improved irrigation and drainage services by the project (ha)	14,743	13,362
		NEW: Area cultivated during the dry season in the irrigation schemes targeted by the project (ha and %)	3,000	4,150 25%
Improved management of about 8 sub-watersheds through capacity strengthening and investment in watershed infrastructure	8	DROPPED	n/a	n/a
Increased Government support for agricultural intensification in irrigated and rainfed areas through increased public expenditures (%)	10	DROPPED	n/a	n/a
Increase in land area under sustainable management as a percentage of baseline, in targeted project intervention areas (%)	20	REFORMULATED: Area under SLM practices in project intervention zones (ha).	5,100	2,051
Increase in vegetation cover as a percentage of baseline (%)	15	DROPPED	n/a	n/a

Source: Source: World Bank 2006 (IDA PAD) and World Bank 2008 (GEF Project Brief).

1.4 Main Beneficiaries

16. At appraisal, the first phase of the APL program was planned to cover about 21,780 hectares of irrigation schemes (out of a total of 66,000 hectares for the six sites to be included in the overall APL program). Direct beneficiaries would include about 30,000 smallholder households producing irrigated and rainfed crops, and farmers' groups and private operators providing services, selling products, and performing various functions in the value chain.

1.5 Original Components (as approved)

17. The project had three technical components and a management component. (See Annex 2 for a more detailed description.)

Component A – Development of Commercial Agriculture (Total cost US\$12.7 million, i.e. 31% of total project cost, including IDA US\$ 7.5 million (59%), GEF US\$2.7 million (21%) and beneficiaries US\$2.5 million (20%))

18. The objective of this component was *to lay the foundations for improved market access and sustainable intensification and diversification of irrigated and rainfed agricultural systems in the project's watersheds*. It was planned that the component would include the project area as a whole, both irrigated and upland areas, and would achieve its specific objective through an approach focused on market-driven demand, agricultural technology development and dissemination, private sector initiative and vertical integration of supply chains, as well as promotion of partnerships among stakeholders (including public-private partnerships (PPP)). The component included two sub components: (i) Support to agricultural services, and (ii) Support to private investment, through a cost sharing mechanism.

Component B – Irrigation Development (Total cost US\$17.5 million, i.e. 43% of total project cost, including IDA US\$15.7 million (90%) and beneficiaries US\$1.8 million (10%))

19. This component aimed *to lay the foundations for improved management, maintenance and sustainability of irrigation services provision in four large-scale irrigation schemes through rehabilitation of irrigation infrastructure, capacity strengthening of stakeholders and clarification of roles and responsibilities, and establishment of an appropriate incentive framework*. The component included two sub-components: (i) Support to irrigation development and (ii) Irrigation investments. (i) Support to irrigation development entailed supporting the participatory preparation of Scheme Development Plans (SDP) and annual Performance Contract (PC), negotiated between WUAs, the DRDR and the Communes, as part of broader Watershed Master Plans (WMP). The SDPs and PCs would provide the overall framework for support to irrigated agriculture, including possible investments in the rehabilitation of irrigation infrastructure. The project would also support stakeholders during implementation of the PC, through capacity strengthening, mobilization of water users, annual evaluation of performance indicators and user satisfaction surveys. Studies would be conducted into O&M costs and cyclone damage to irrigation infrastructure among other matters. (ii) The Irrigation investments sub-component would support the rehabilitation of irrigation and appurtenant infrastructure, including technical design studies, implementation of works, and their supervision.

Component C – Watershed Development (Total cost US\$4.3 million, i.e. 11% of total project cost, including IDA US\$1.8 million (42%), GEF US\$2.4 million (56%) and beneficiaries US\$0.1 million (2%))

20. The objective of the component was *to lay the foundations for sustainable management of watersheds including irrigated and rainfed agriculture, the conservation of the natural heritage, and improved productivity of the natural resources*. An integrated and participatory approach to watershed management would be adopted to make rural populations more accountable and encourage them to manage land and natural resources more sustainably. This component included the following two sub-components: (i) Planning and capacity building for sustainable management of watersheds, including (a) preparation, as part of WMPs, of WDPs in the four project areas; (b) preparation of participatory plans for managing approximately eight sub-watersheds (each between about 10 and 500 km²); (c) support to communication and

negotiation platforms, (d) training and capacity strengthening of SLM groups; and (e) support to improvement of land tenure security; and (ii) Sustainable investments in watersheds, to be determined through participatory negotiations, local strategies for controlling erosion, arresting gullies and reducing the sediment load of river runoff. The project would finance investments in strategic anti-erosion works (through biological and other methods); and (b) interventions, through matching grants, on communally owned land to improve plant cover, reforestation and pastures through strengthened technologies and management transfer of natural resources.

Component D – Program Management (Total cost US\$4.3 million, i.e. 11% of total project cost, including IDA US\$3.5 million (79%) and GEF US\$0.9 million (21%))

21. This component aimed *to manage and use resources in accordance with the project's objectives and procedures, and to put in place a policy framework that would be favorable to upscaling of the project to the national level*. It was foreseen that this component would finance the following subcomponents: (i) Management of the project ; (ii) Support to national policies, including support to the development of major national policies, regulations, and plans considered critical to the GoM's PN-BVPI, and support to emerging professional groups; and (iii) Monitoring and evaluation (M&E).

1.6 Revised Components

22. Although they were not formally revised, the scope of activities planned under Components A (Development of Commercial Agriculture) and B (Irrigation Development) was adjusted during the two main restructurings, followed by a third one in May 2014.

- (i) The first restructuring in February 2011 occurred when the delayed processing of the GEF grant prompted a reallocation of funds from the first two components to the Watershed Development Component, component. This reduced the number of sub-grants and focused investments under the sub-grants on production-related activities only, including seed production, distribution of inputs and support to community granaries. Under the second component, the target for rehabilitation of irrigated areas was reduced from 21,000 ha to 15,000 ha. The objective was to free up funds to start the implementation of the Watershed Development Component which was getting pushed back due to the delayed processing of the GEF grant (see section 2.1 regarding GEF grant delayed approval).
- (ii) The second restructuring in August 2012, after the GEF agreement had been finally signed in December 2011, increased the number of sub-grants but did not reintroduce the market access-related and other support investments to avoid the risk of the funds getting too thinly spread over a wide range of activities. Along the same lines, it was decided that production-related activities in irrigated schemes would focus exclusively on rice, thus leaving out diversification support. Additionally, the irrigation rehabilitation area target was increased to 19,000 ha.

1.7 Other Significant Changes

23. A third restructuring in May 2014 pushed the closing date back to the end of the calendar year.

- (i) A third restructuring took place in May 2014 to complete some critical irrigation activities (Ankaibe weir and primary canal construction) that had been delayed by adverse climatic conditions, a six month extension to the closing date to December 31, 2014 was granted. Total elapsed project implementation period aggregated to 8 years.

2. Key Factors Affecting Implementation and Outcomes

2.1 Project Preparation, Design and Quality at Entry

24. The project preparation team made commendable use of rich analyses of previous investment operations in the irrigation sector in Madagascar and the reasons for their historically disappointing performance (see section 1.1). The IWMP was prepared at the same time that a new irrigation development paradigm was being formulated with the GoM that materialized in the *Lettre de Politique de Développement des Bassins Versants et Périmètres Irrigués* and the corresponding NIWMP (both 2006). This process accounted for the longer than usual project preparation time (2 years) but as a result, the IWMP was conceptually fully consistent with the GoM's new strategy.

25. During preparation though, a reduced IDA allocation prompted a change in project design from a SIL to an APL, which resulted in a less than ideal design with a shorter four year project period for a rather complex project incorporating market-, production-, infrastructure rehabilitation- and land conservation-related investments - all with cost-sharing mechanisms, capacity and institutional building, land titling, etc., and planning to use a fair amount of consultant inputs to support the project in all these areas. With the benefit of hindsight, it appears clear that the project was too ambitious with respect to its new format and had little probability of being able to move to a consolidation phase after four years, even without the delays generated by the late processing of the GEF grant and the political crisis.

26. The GEF grant was originally included together with the IDA credit in one single package, and the two sources of funds were supposed to be fully blended. However changes in the processing of GEF grants related to sustainable land management, which had to follow a newly established strategic planning process at country level. These changes resulted in a split approval process by which the IDA credit was first approved in November 2006 and the GEF grant was processed as a separate package. The GEF grant was finally approved on November 6, 2008. Shortly thereafter, in March 2009, and before the GEF grant agreement could be signed, Madagascar experienced a non-constitutional change in government and operations in the country were suspended (OP/BP 7.30). On May 6, 2010, the World Bank's senior management authorized the resumption of disbursements for selected projects, amongst which the IWMP, on humanitarian grounds. In April 2011, World Bank senior management authorized the signing of the GEF grant agreement, which was done in December 2011.

27. Another deficiency was the design of M&E. Outcome indicators (table 2) were rather qualitative (“dissemination of innovative technologies...”, “improved management...”, “increased support...”, etc.). Though the PDO contained a clear dimension of sustainability and replicability (“*establish a viable basis for irrigated agriculture and natural resources management*”), PDO level indicators bore little relation to impact or sustainability. In addition, a number of indicators were poorly defined, in particular those expressed as a percentage increase of a baseline situation that apparently was never assessed afterwards. The revision of the result framework during the restructurings of 2011 and 2012 allowed a better quantification of the PDO level results indicators (table 2). However, a large number of the PDO level indicators introduced at restructuring proved to be rather redundant with the component outputs indicators and therefore, impact and sustainability remained understated (see detailed discussion of result framework and achievements on indicators in Annex 2).

28. By contrast, a very relevant choice that was made during the design stage was to implement the project through the GoM structure. The overall coordination of the project was insured by the Ministry of Agriculture itself, through the coordination unit (*Cellule de Coordination*, CelCo) that had been established to oversee the PN-BVPI, while the Regional Directors for Rural Development (DRDR) were responsible for project coordination in their respective regions. The CelCo and the DRDRs were reinforced with technical assistance (one international TA at central level and one national TA at each DRDR level) and the support of an external financial management agency.⁷ Although seen as not being exempt of risk at appraisal (see below), this option allowed the Ministry of Agriculture and its regional directorates to be fully involved in project implementation and to greatly enhance their capacities. Such an organizational setting was also instrumental in ensuring the preservation of project assets during the 2009-2010 disbursement freeze period.

29. The potential risks of the project that were identified at appraisal are presented in table 2 below, together with the mitigation measures that were envisaged and their actual effectiveness. In retrospect, it can be concluded that the operational risks that were identified at appraisal were real and proposed mitigation measures valid. However, the project failed to apply some of these mitigation measures and the failure of the M&E system (see section 2.3) did not allow the introduction of corrective measures. Two major risks were omitted at appraisal: the risk of low rate of adoption of new technologies *also* in irrigated schemes (implying that the matching grant approach would fail to produce its expected results), and more generally, the risk for the project to somehow revert, during implementation, to some of the shortcomings that had characterized previous irrigation development experiences (see section 2.2).

⁷ Total TA cost amounted to Ar 4.2 billion, i.e. 6 percent of total project costs.

Table 2: Critical risks as identified at appraisal and mitigation measures

Risks	Rating¹	Mitigation measures	Mitigation effectiveness
<p>Operational</p> <p>- Farmers unwilling to pay for irrigation O&M costs</p> <p>- Cyclone damages</p> <p>- Failures of communities to cooperate in watershed management approaches (addition of 2008 GEF Project Brief)</p> <p>- Low rates of adoption of SLM technologies and low capacity of communities to adopt technologies (addition of 2008 GEF Project Brief)</p>	<p>S</p> <p>S</p> <p>M</p> <p>M</p>	<p>Adoption of a contractual approach (PCs), support to WUAs, involvement of communes, increased incomes through improved linkages in supply and marketing chains</p> <p>The project will help operationalize the Irrigation Maintenance Fund and develop climate-proof designs for irrigation repair works.</p> <p><i>The project will support communities to obtain benefits from watershed sustainable management activities, through obtaining matching grants, land rights, and by developing economically viable activities.</i></p> <p><i>The project will:</i></p> <ul style="list-style-type: none"> - build on already tested and adapted technologies; - develop a sliding scale for matching grants, with proportionally higher grant money for activities with higher public service values; - invest in capacity strengthening of project participants. 	<p>While value chain related investments were eventually dropped, support to WUAs and PC approach involving Communes were effectively implemented; they were however not enough to guarantee satisfactory O&M fee collection rates by project closure (see section 3.2).</p> <p>Not finalized by project closure. Note that the proposal for the Irrigation Maintenance Fund was developed but rejected by the National Assembly. Climate-proof designs for irrigation works have been developed under a separate project (PUPIRV).</p> <p><i>High subsidy rates were applied (100% for anti-erosion measures and 80% for productive investments). However, delays in establishing operational guichets fonciers, land status issues and lack of interest of the beneficiaries for the economic SLM activities proposed on uplands did not allow to effectively mitigate the risk and as a result, the achievements on uplands remained limited and their sustainability is at risk (see sections 2.2, 3.2 and 4).</i></p>
<p>Policy</p> <p>GoM does not follow a sound seed and fertilizer policy based on private providers, as well as a favorable environment for private agribusiness development.</p>	<p>M</p>	<p>Adoption and implementation of GoM seed and fertilizer policies were covenants under the project</p>	<p>Covenants were complied with for fertilizer and partially complied with, with delay, for seed. For fertilizers, risk actually proved to be little relevant to the project since fertilizer use did not increase substantially with the project (see section 3.2). Same for agribusiness development since the value chain related investments were dropped.</p>
<p>Management and control</p> <p>- Lack of experience and delays in producing quality financial reports and audits</p> <p>- Risk of non-availability of communities participation (addition of 2008 GEF Project Brief)</p>	<p>S</p> <p>S</p>	<p>Recruitment of financial management agency and international auditing firm</p> <p><i>No transfer to community shall be made unless the counterpart funds have been deposited in the community bank account.</i></p>	<p>Agencies recruited and financial management rated <i>Satisfactory</i> during most of project life and at the end of the project (see section 2.4)</p> <p><i>Correctly implemented.</i></p>

Note: ¹ S: Substantial; M: Moderate.

Source: World Bank 2006 and World Bank 2008, authors' appreciation.

2.2 Implementation

30. The two main elements that combined to adversely affect implementation were arguably the very late entry into effect of the GEF grant, the limitations put on dialogue with the Government and Ministry officials and the 18-month freeze of disbursements due to the political crisis in 2009. Concretely, the political crisis and ensuing response from Bank management generated significant hurdles for project implementation:

- (a) Institutional costs: loss of the capacity that had been built up in the Ministry-led PIU and reversal of the institutional reforms the project had started supporting.
- (b) Direct economic costs: several contracts had to be suspended with subsequent demobilization and remobilization costs; some contractors/suppliers requested early termination of their contracts that had to be paid by the client and the retendering of those contracts came at a higher price. Note that some SMEs with which the Project had developed partnership went bankrupt because they could not sustain the delayed payments.
- (c) Indirect economic costs: postponement of the benefits to be expected from the sub-projects which will not be completed or will be completed at a later date.
- (d) Impact on sustainability and effectiveness: At the time of the disbursement freeze, about 12 Water User Associations had already been selected and had deposited their 20 percent upfront contribution (equivalent to the cost of US\$2 million rehabilitation works) on local bank accounts. Once OP 7.30 was lifted and the project resumed disbursements, most farmers did not want to contribute upfront anymore since the farmers who had borrowed from local microfinance institutions to pay their contribution had been put in a difficult financial situation.
- (e) Impact on supervision: all Bank task teams had been instructed not to communicate in writing with government officials (including people working for PIUs) and to avoid going to Ministries and participating in meetings called by Ministry officials. This situation was particularly difficult for the Bank task team as it was being implemented through the MINAGRI's existing structure.

31. Beyond the time and resources used in restructurings, the late entry into force of the GEF grant and the disbursement freeze period were very prejudicial to the project outcomes for at least two reasons: (i) in order to free funds to be reallocated to Component C (Watershed Development), very important elements of Component A (Development of Commercial Agriculture) were dropped, such as support to diversification and support to non-farm investment projects (upstream and downstream investments, microfinance, etc.); at the end, having concentrated on agricultural intensification (with the exception of the support extended to ASCs that achieved limited results though, see section 3.2), Component A as it was implemented is the only one that looks very different from what was envisaged at appraisal and made explicit in its name (Development of Commercial Agriculture); and (ii) because of the delays incurred, most of the project achievements were obtained in the last few years of implementation and could not be consolidated before the end of the project.

32. The evaluation of project outcomes also suggests that project appraisal underestimated the risks of somehow reverting, during implementation, to some of the shortcomings that had characterized previous irrigation development experiences, in particular: (i) focus on technical extension messages with little attention paid to the economic constraints farmers are facing and little effort to differentiate between farmers (e.g. subsistence, commercial, etc.) in order to develop a range of messages, technologies, and accompanying modes better adapted to each farmer category; (ii) insufficient emphasis put on issues such as land tenure security, access to credit and markets and diversification that are critical for sustainable and replicable productivity enhancement; (iii) insufficient attention paid to the human and material resources needed, during and after the project, to accompany the beneficiaries and their associations until they can possibly be weaned off external support without jeopardizing sustainability; and (iv) insufficient attention paid to the importance of feeder and main road infrastructure status to maximize project outcomes. While road rehabilitation was not within the project scope (though it was stated in the PAD that the Regions and Communes would be responsible for critical inter-communal roads rehabilitation and maintenance of the roads within the schemes), it is clear that the deteriorating state of the access roads to some of the project sites (in particular the road leading to the Lac Alaotra area, which is Madagascar's main rice basket) and of feeder roads within the irrigation schemes is likely to weaken any achievement on the agricultural productivity side.

33. The limits of the matching grant approach adopted under Component A (Development of Commercial Agriculture) for improved dissemination of agricultural technology became evident during implementation. Intensification sub-projects (rice intensification in irrigated schemes and under-cover cultivation on uplands⁸) were to be implemented over a 3 year cycle, with a project subsidy decreasing from 80 percent in Year 1 to 50 percent in Year 2 and 20 percent in Year 3. The dropping-out rate proved to be extremely high at 32 percent between Year 1 and Year 2 and 86 percent between Year 2 and Year 3 for subprojects in irrigated schemes, where only about 10 percent of all sub-projects financed completed the 3 year cycle. Drop-out rates were even worse in uplands where 82 percent of under-cover cultivation sub-projects did not make it to Year 2, and no sub-project reached Year 3. Clearly, farmers took advantage of the opportunity they were given to use heavily subsidized new technologies in Year 1 but, due to the risks incurred and/or lack of labor and/or lack of access to finance, preferred (or had no other choice than) stepping down to less capital intensive cropping practices in Year 2 and especially in Year 3, generally continuing to apply the improved practices that do not entail cash outlays (such as earlier and in-row transplanting, etc.). A program associating demonstration plots, more intensive support (lower ratios of farmers to extension agents), message/type of support differentiation across farmer categories and microfinance access enhancement for the technically/commercially more advanced farmers could certainly have brought about better results in terms of sustainable adoption of improved technologies.

34. The project as it started being implemented was also too ambitious in terms of beneficiary contributions to the rehabilitation works. While the PAD had advised that a

⁸ Cultivation under vegetative cover represented 58 percent of the subprojects implemented on uplands. Other intensification subprojects on uplands, such as fruit tree farming (32 percent) were implemented on a 1 year cycle (possibly spread over 2 years), with a 80 percent subsidy.

preliminary study “would provide guidance on what farmers can reasonably be asked to pay in terms of O&M and the annual contribution to the PC,” beneficiary contribution was initially set at 20 percent of total work costs, to be collected upfront, and this resulted in most of the planned works being upheld. At Mid-Term Review (MTR) in September-October, 2011, only 10 percent of component B2 relative to irrigation scheme rehabilitation had been disbursed. The MTR usefully introduced the concept of *Montant d’Apport Préalable Estimé Réaliste* (MAPER), upfront contribution considered realistic, as actually originally planned by the PAD, and it was decided that from then onwards the MAPER would no longer be a contribution to the works but a contribution to infrastructure maintenance. The MAPER, along with other *Gros Entretien et Renouvellement* (GER - major repairs and replacement)⁹ contributions collected by the WUA over the duration of its PC (that was also extended from 1 to 5 years by the MTR), was lodged in a bank account jointly operated by the WUA and the DRDR.

35. Another key factor that positively affected project implementation was arguably the contracting in April 2011 of two strategic partners (SP),¹⁰ in order to accelerate the implementation of activities in the four regions and to compensate for the multiple delays during the prolonged disbursement freeze. These strategic partners were local consultant firms with international experience working under the direct supervision of the DRDR in each region. They provided the field technicians and support staff that were necessary to ensure the day-to-day assistance (training, monitoring, technical support) to the various groups of beneficiaries under the three project components, and were the right arm of the DRDR in implementing the project activities. To enable them to cope with the amount of work, especially the high interest expressed by farmers to participate in sub-projects, a reinforcement of the SPs’ human resources had to be financed by the project and it was also decided to select and train relay farmers to serve as intermediaries between the SPs’ agents and farmers groups. A total of 125 relay farmers were trained, equipped with bicycles and small equipment, and given allowances to help convey extension messages to their peers. Similarly, as of 2013 the project supported, in the form of a 100 percent subsidy the first year and 50 percent the second year, the hiring by the WUAs of a technician (generally one of their members) to coordinate the distribution of water and O&M works in their perimeter. Both systems proved successful, although the continuation of the former could not be guaranteed after the end of the project.

36. The last and most important single realization of the IWMP that necessitated the final six month extension of the closing date and consumed two-thirds of the expenditure on Component B (Irrigation Development), and 21 percent of total project cost, was the construction of the weir and the feeder canal of the Ankaibe irrigation scheme in Sava region. The Ankaibe irrigation scheme, of a total area of 2,100 ha, had been supplied by a pumping station in the past and had been in disuse since the breakdown of that pumping station. The construction of the Ankaibe weir and feeder canal was not originally included in the project since it was decided at preparation stage to focus on already functional irrigation schemes. Its inclusion in the project was decided in early 2012 as a response to the low disbursement rate of Component B (10 percent at the end of 2011), due to various delays in studies, beneficiaries’

⁹ Note that GER funds are different from the water user fees also collected by WUAs that are lodged in a different account and used for routine O&M interventions.

¹⁰ BRL in Itasy and Andapa, GERCO in Marovoay and Lac Alaotra. Total SP cost amounted to Ar 7.2 billion, i.e. 10 percent of total project costs.

contribution mobilization (especially before the introduction of the MAPER in 2011, see above), tenders, and works.

37. Government commitment was rated *Satisfactory* in ISRs until October 2011 and *Moderately Satisfactory* from then onwards. Overall, as a result of the project being implemented through GoM's structure, GoM's ownership of the project appears to have been satisfactory both at central and regional levels. Similarly, the many participatory approaches that were implemented for all activities, through the use of tools formulated and validated in a participatory manner (WMPs, WDPs and SDPs, PCs, etc.) and the creation and/or strengthening of a myriad of effective beneficiaries' groups (WUAs, sub-project groups, GGDTs, GOGEs, etc.), resulted in a level of ownership among the project beneficiaries evaluated as *Satisfactory*. Finally, the Government contributed a substantial budget towards the implementation of the Ankaibe weir and feeder canal resettlement action plan.

2.3 Monitoring and Evaluation (M&E) Design, Implementation and Utilization

38. M&E was the responsibility of a dedicated unit in the CelCo. The project M&E system was downgraded to *Moderately Unsatisfactory* in ISRs from end-2008 to end-2010 owing to the prolonged difficulties the project encountered in establishing a logical sequence of indicators that could be easily measured to assess results and ensuring consistency between the reports produced by the project and the M&E manual. The M&E system rating was restored to *Moderately Satisfactory* in March 2011, and remained so until the end of the project, on the grounds that the results framework had been updated and the M&E system was reportedly producing data needed to track progress, and the data was being used by project management.

39. As already pointed out in section 2.1, the project M&E quality at entry was low and that was only partially corrected later on with support from the Bank. The project M&E also suffered from weak capacities that resulted in several shortfalls: (i) figures were gathered and endorsed by the M&E unit without much questioning and double-checking, while some of them obviously looked over-optimistic and were bound to attract skepticism (see discussion of results indicators in Annex 2); (ii) the M&E system focused on gathering quantitative data in terms of project outputs (monitoring) but largely failed to produce more qualitative data in terms of project impact and sustainability (evaluation) that would have been useful throughout the project life to possibly reorient some of the project activities.

40. Two evaluations of project output and impact indicators had been planned at appraisal, one at MTR and one at the end of the project, but only the latter was carried out (Altec 2014). Deficient M&E did not permit a meaningful evaluation of outcomes at project closing.

2.4. Safeguards and Fiduciary Compliance

Social and Environmental Safeguards

41. The project had been categorized as a Category A project, since three of the project sites were located in areas with globally important biodiversity resources. Five Safeguard Policies were triggered: Environmental Assessment (OP/BP 4.01); Natural Habitats (OP/BP 4.04); Forests (OP/BP 4.36); Pest Management (OP 4.09); and Involuntary Resettlement (OP/BP 4.12). Overall safeguard compliance was rated either *Moderately Satisfactory* or *Satisfactory* throughout the project life and was rated *Satisfactory* at the end of the project. It

was noted that the project had made a significant effort to implement the safeguards action plans agreed upon during the various implementation support missions. It was also noted that the capacity of the project team to manage environment and social safeguard activities had been strongly enhanced through clinics and on-the job-training, as was illustrated by the successful formulation and implementation of Environment and Social Impact Assessments and Resettlement Plans.

42. It was noted during the preparation of the ICR that one of the target irrigation schemes (Sahamaloto) was supplied by a dam of less than 15 m in height but of more than 3 million m³ in volume. Under the current interpretation of OP4.37 "Safety of dams," the water volume of this dam would lead to its classification as a *large dam*. The project did not undertake any construction works on the dam itself but it rehabilitated an irrigation network of primary and secondary channels, mostly dredging irrigation channels and reinforcing embankments, that is dependent on the dam. Under the current definition of OP4.37, the policy should have been triggered.¹¹ Paragraph 8 and subsequent paragraphs of OP4.37 require an independent safety review and if necessarily, other safety measures.

43. The potential adverse environmental and social impacts of the rehabilitation works on the primary and secondary channels were limited due to their localized, small scale and site-specific nature. Although the project is rated as a Category A, the impacts observed during regular supervision missions and managed on the Sahamaloto schemes are typical of category B projects.

44. During the ICR Review meeting, it was agreed that since the ongoing PURSAP project would be financing follow-up activities on the same dam and the irrigation scheme, PURSAP should trigger OP 4.37 "Safety of Dams." This will be done through a Level 1 restructuring. In parallel, the panel of dam experts required under OP4.37 (consisting of a geotechnical expert and a dam structure/safety expert based on TORs approved by the Association) will be established to review and assess the Sahamaloto dam. The said panel would identify measures, *if required*, to comply with the OP, and those identified measures would then be agreed for implementation under that project.

Financial Management.

45. Financial management was rated *Satisfactory* during most of the project life and this rating was confirmed by the last supervision mission of December 2014. An experienced external financial management agency was hired from the outset, the project had a sound manual for internal procedures, and an internal auditor was recruited in August 2011. These three elements allowed management to considerably reduce fiduciary risk and to produce timely and high quality financial reports.

¹¹ Paragraph 7 of OP4.37 indicates the types of existing dams which should trigger the policy, such as ".....where failure of the upstream dam could cause extensive damage to or failure of the new Bank funded structure; and irrigation or water supply projects that will depend on the storage and operation of an existing dam for their water supply, and could not function if the dam failed."

Procurement

46. Procurement rating varied between *Moderately Satisfactory* and *Satisfactory* over the project life and was synthesized as *Satisfactory* by the last supervision mission in December 2014. Although some difficulties were experienced, the project team, both at central and DRDR level and with the support of the central administration, always reacted swiftly in solving problems and improving procedures. The last supervision mission confirmed that all procurement under the project had complied with the Bank's rules and procedures.

2.5 Post-completion Operation/Next Phase

47. Most of the triggers for moving to the planned second phase of the APL program (see section 1.2) have been met, at the exception of the establishment and operationalization of an institutional mechanism for the funding of non-transferable irrigation infrastructure (FERHA). Following the country's return to constitutional order in early 2014, it was decided jointly with the Ministry of Agriculture to continue supporting the sector with a combination of IPF operations, one of which is focused on a more sustainable watershed and irrigation management and the other supports the development of agricultural value chains and land titling. Both operations are under preparation and build on the lessons emerging of the BVPI and similar projects in other countries.

48. In the short run, some achievements of IWMP are in urgent need of consolidation: (i) all IWMP supported WUAs need continued assistance to gain autonomy and become fully viable entities; (ii) the outstanding works on the Ankaibe perimeter must be finalized and support extended to WUAs and farmers in order to derive the full benefits of the Ankaibe diversion weir and feeder canal investment; (iii) in the perimeters where the works planned in the PCs have not been, or only partially, implemented under IWMP¹², an approach has to be urgently defined in order to meet GoM's commitment and avoid losing the beneficiaries' trust; (iv) for IWMP soil conservation investments (afforestation, improved pasture, etc.), long-term arrangements have to be developed with local populations in order to ensure the maintenance and sustainability of the investments; (v) continued assistance should be extended to the five IWMP supported *guichets fonciers* to ensure that they effectively start delivering land certificates; (vi) the monitoring of paddy yields on the irrigation schemes that benefited from IWMP must be continued; and (vii) the FERHA must be operationalized.

49. Some of the above activities will be supported by a Bank funded emergency operation that was launched in September 2014, the *Projet d'Urgence pour la Sécurité Alimentaire et la Protection Sociale* (PURSAPS, Emergency Food Security and Social Protection Project, US\$65 million); its IWMP-like component (about US\$24.5 million) is being implemented in eight regions including the four regions that benefited from IWMP. PURSAPS is planned to help consolidate IWMP's results through: (i) continuation of assistance to the IWMP supported WUAs whose PCs have not yet completed their 5 year cycle; and (ii) implementation of some

¹² This is in particular the case for the sectors 4 and 5 of Marovoay, where most of the works planned in the PCs have not been implemented and where PURSAPS does not plan to take over, and Sahamaloto, where PURSAPS plans to finance only a minor part of the outstanding works (see Annex 2 Appendix 2).

of the rehabilitation works that could not be implemented before IWMP's closing (list in Annex 2 Appendix 2).

3. Assessment of Outcomes

3.1 Relevance of Objectives, Design and Implementation

50. **Rating: High.** As already seen in section 1.1, the PDO was – and still is – highly relevant. Over the past decades, increases in rice yields have not kept up with the high rate of population growth, putting pressure on land and other resources and explaining in part the persistent high rates of poverty. Paddy production continues to be characterized by extremely low levels of productivity, resulting from a combination of factors, including limited uptake of improved technology, land tenure insecurity, lack of access to credit, inadequate storage facilities, and deficient transport infrastructure. In addition, most irrigation schemes are far from being fully operational, often due to high sedimentation and lack of maintenance. The IWMP's integrated approach encompassing agricultural intensification and better water users' organization in the irrigation schemes and SLM activities in the uplands was and remains therefore fully justified.

51. Similarly, most of the project's major design features and implementation modalities as they were defined at appraisal and as they evolved over the project life were highly relevant. In particular, the choice of implementing the project through the GoM's structure (Ministry of Agriculture's CelCo at national level and DRDRs at regional level) was arguably the most risky and ambitious in terms of capacity building and ownership and chances of sustainability, and it proved to be a success with adequate assistance (TAs, SPs and external financial management agency). The highly participative way the project was implemented is also considered a success to be built on in future operations. The introduction of SPs and MAPER were decisive in accelerating implementation.

3.2 Achievement of Project Development Objectives

52. Several key development indicators were reportedly achieved at project closure, but due to the weakness of the project M&E framework, many of these indicators are marred with uncertainty while others had had a somewhat evolving definition and/or target values. The ICR authors therefore had to revisit many of the final indicator values announced by the project (see Annex 2) and the assessment of PDO achievement is based on the new values obtained. When targets were reduced in the course of project implementation without convincing explanation provided in the Restructuring Paper, the ICR team considered both the original and the final values and gave more weight to the earlier. In addition, the authors had to interpret the set of results used to assess the PDO using all the information available knowing that, as noted above, the M&E system largely failed to produce more qualitative data in terms of project impact and sustainability.

Achievement of PDO in irrigation activities: Rating: Modest.

53. The objective was to establish a viable basis for irrigated agriculture in four main irrigation sites. Basically, the foundation for this objective is rooted in these four specific outputs under the project: (a) improved irrigation and drainage service; (b) incremental number

of farmers adopting new technologies; (c) increased area cultivated during the dry season; (d) increased area cultivated with non-rice crops (diversification). In terms of viable operation, there are three key actions: (a) operational CSAs linking farmers to service providers; (b) WUAs operational and providing for O&M; and (c) establishment of regional FERHA for O&M. The results of the watershed management component were also to have an impact on irrigation scheme viability by reducing the maintenance requirements (desilting).

54. Although the average yields in the project area have undoubtedly increased, the extent of this increase is likely to be lower than reported by the M&E system. The farm level financial returns from the intensification packages disseminated by the project on the irrigated schemes were not sufficiently attractive to ensure a widespread uptake of the new technologies, as demonstrated by the high drop-out rate between Year 1 and Year 3 of the subprojects cycle as subsidies were phased out and further confirmed by the financial analyses included in this ICR (section 3.3). Farmers and technicians in all three regions visited by the ICR mission (Itasy, Boeny and Lac Alaotra) concurred that 25 to 40 percent of the irrigated schemes area is now cultivated using the technologies introduced by the project, with the exception of fertilizers. The average yields that the project claims to have achieved were therefore applied to 30 percent of the schemes area whereas it was assumed that the remaining 70 percent of the schemes still apply traditional technologies and thus have unchanged yields. Under this scenario, the average yield at the end of the project would be 3.4 tons/ha, giving a 41 percent achievement of the objective of an increase from 2.7 to 4.4 tons/ha and a 26 percent increase in absolute terms. The result is certainly not negligible but remains modest compared to the original objective.

55. Moreover, the original focus on crop diversification and increase in cropping intensity was lost in the course of project implementation. Since this is an important component of irrigated agriculture viability in the context of an ever increasing fragmentation of the land, this part of the “viable basis for irrigated agriculture” is certainly missing.

56. The increase in the area with reliable water control was estimated by this ICR to be of the order of 7,500 ha over a baseline at project start of about 5,000 ha (see Annex 2). This is a 50 percent achievement against the original target value which is substantial.

57. The number of beneficiaries remains difficult to assess since farmers had access to various types of benefits that were loosely interrelated. Assuming an average area of 0.9 ha per farmer, the beneficiaries of improved irrigation and drainage services would be 8,300. There were 12,331 beneficiaries of intensification subprojects on irrigated areas. These numbers are modest to substantial when compared with the total number of water users in the four sites (22,790). No explanation was provided in the PAD with regard to the original target for the entire project (30,000) but it is clear that the target related to irrigated agriculture could not have been higher than the total number of farmers in the four sites.

58. Regarding the requirements for viable operations, the five ASCs were established but their impact remained limited and was mostly focused on collecting and making available to farmers input and output prices in their respective region and assisting the farmers in organizing themselves in order to access the project services. Results in terms of linking farmers to suppliers, produce collectors, and finance institutions were lower than planned. The irrigation scheme management by WUAs, although significantly strengthened by the project as demonstrated by the 30-fold increase of irrigation service fees collected, remains fragile and requires further support to be consolidated in a financially viable undertaking. O&M charges

recovered in 2014 amounted to 53 percent of the Ar 540 million target – which may just have been over-ambitious (see Annex 2 for details). The FERHA was not established at project closing.¹³

Achievement of PDO in watershed management activities: Rating: *Modest*.

59. The objective was to establish a viable basis for natural resources management in the surrounding watersheds of the four irrigation sites. The achievement of this PDO is premised on the following main actions: (a) development of Watershed Management Plans and related Sub-watershed Management Plans; (b) erosion control and reforestation; and (c) beneficiaries adopting Sustainable Land Management practices. In terms of viable operation, five *Guichets Fonciers* were to be strengthened to secure with land certificates the investments made in the watershed areas.

60. The main outcome as indicated is area under SLM practices. The original target from the PAD is not known in the absence of a baseline, and the final achievement rate varies from 59 percent against final target value set at second restructuring to 147 percent against the target value set at first restructuring. This achievement is very modest in absolute value compared to the watershed total area (less than 5 percent). In addition, the drop-out rate for under-cover cultivation sub-projects on uplands was 100 percent between Year 1 and Year 3, making the lack of interest of farmers for this SLM technique evident. The area under vegetation cover which was the second key indicator in the PAD was dropped after the first restructuring and the original target is not known either.

61. Based on the revised values estimated by the authors for the intermediate outcome indicators (see Annex 2), two of the six component C outputs were achieved. Another two were achieved with qualification, meaning that although the actual value meets or exceeds the target the results are to be considered with caution and remain fragile. The last two outputs were not achieved when compared to the original targets from the PAD.

62. Five *guichets fonciers* were established and supported as planned, but apart that of Marovoay that was also supported by the *Programme de Lutte Anti-Erosive* (PLAE, Anti-Erosion Program), they were not in a position to deliver land certificates until after seven years of project implementation due to delays in the acquisition of aerial photography. It appears that some of the communes involved in the project are not maintaining their *guichet foncier* any longer, meaning that the investment in terms of capacity building may be partially lost. Hence the achievement here should also be considered as modest.

63. Overall, there are only modest indications that a viable basis was established for sustainable watershed management and maintenance of the erosion control and afforestation works implemented by the project.

¹³ The project supported the revision of the Law 90-016 regarding the management, maintenance and police of the irrigation networks (République de Madagascar 1990). The new Law 14-042 that in particular provides for the establishment of FERHA at national and regional levels was finally adopted by the Parliament in December 2014 and promulgated in January 2015 (République de Madagascar 2015).

64. Overall achievement of the PDO is therefore rated as *Modest*: “a viable basis for irrigated agriculture and natural resources management” was established in terms of validated approaches and tools (project management through GoM structure, WMPs, WDPs and SDPs, PCs, MAPER, relay farmers, etc.) but more work remains to be done in terms of adapted technical packages including diversification. The same rating applies to the GEO based on the assessment of Component C outcomes.

3.3 Efficiency

Project costs

65. The project used 96 percent of IDA resources and 89 percent of GEF resources. The contribution by beneficiaries was estimated at Ar 4.2 billion – about US\$2 million, (details in Annex 3), i.e. 45 percent of their originally planned contribution. This is due to the fact that the project did not eventually finance sub-projects at downstream value chain level (storage, processing, marketing), for which it was originally planned that beneficiaries would contribute over US\$ 1 million, and that the project financed at 100 percent a number of non-transferable infrastructures that were not included in the initial project design, amongst which the Ankaibe weir.

66. The distribution of actual spending across components was slightly different from that originally planned (table 5). Principally due to three time extended project duration, Component D (Project Management), with 28 percent of total project costs, exceeded its originally planned share, mainly at the expense of Component A (Development of Commercial Agriculture) and Component B (Irrigation Development).

Table 3 : Distribution of planned and actual project spending across components (including beneficiaries’ contribution)

Components	Planned at 2 nd restructuring (2012)	Final
A. Development of Commercial Agriculture	26%	22%
B. Irrigation Development	36%	32%
• <i>Ankaibe excluded</i>		11%
• <i>Ankaibe</i>		21%
C. Watershed Development	19%	19%
D. Project Management	19%	28%
Total	100%	100%

Source: Authors’ calculations from World Bank 2012, CelCo, MINAGRI 2014.

67. The distribution of actual spending within Component B (irrigation) also differed greatly from what was planned at appraisal. Various delays in studies, beneficiaries’ contribution mobilization (especially before the introduction of the MAPER in 2011, see section 2.2), tenders and works resulted in only a minor proportion of the rehabilitation works planned to be implemented. In particular, the level of financial realization of the rehabilitation works planned in feasibility studies is estimated at 12 percent for the four regions, Ankaibe excluded (see Annex 2 Appendix 2 and Annex 3 for details). As a result, while it was planned that the works on the Sahamaloto perimeter would represent two-thirds of total rehabilitation

investments and that the average cost per hectare would be about US\$ 700, the rehabilitation works on all the project perimeters, Ankaibe excluded, only accounted for one-third of Component B infrastructure investments, at an average cost of at US\$ 175/ha¹⁴. The works on the Ankaibe weir and feeder canal that were not originally included in the project made up for the remaining two-thirds, allowing the financial envelope for irrigation rehabilitation to be used up at the very end of the project.

Financial analysis at beneficiary level

68. Despite being repeatedly emphasized by the supervision missions as a critical issue that warranted more in-depth analysis, the feasibility and profitability of the technology packages that were promoted by the project were apparently never given much attention by the project M&E unit. The need for more analysis was especially pronounced with regards to additional labor and financing requirements. Most of the financial analyses that were carried out in the irrigated rice intensification sub-project applications displayed a Value-Cost Ratio (VCR) around 2 or below. This is confirmed by calculations based on two “standard” SRI and SRA models (see Annex 3) using quite optimistic yields (6.3 tons/ha for SRA and 8.0 tons/ha for SRI) and post-harvest loss allowance (10 percent only) and not taking into account equipment amortization, for which VCRs of 1.9 were obtained. A widely held convention is that in “normal” risks situations, a VCR greater than 2 is necessary to provide sufficient incentives for naturally risk-adverse farmers to adopt fertilizer and in especially risky production environments, a minimum VCR of 3 to 4 may be needed.¹⁵ While profitable in theory, the packages promoted by the project, were therefore unlikely to be attractive to farmers in general, and even less attractive in the areas affected by poor water control. This, combined with possible labor shortage and lack of access to credit, certainly accounts for the very high drop-out rates observed between sub-project cycles, as the element of subsidy decreased (see section 2.1), and for the widespread observation that follower farmers around sub-projects generally adopted only the “soft” elements of the packages (such as earlier and in-row transplanting, etc.) and not the fertilizer element.

69. Drop-out rates were even worse for intensification sub-projects on uplands (mostly under vegetative cover cultivation, see section 2.1), reflecting here again the lack of attractiveness of the proposed packages to farmers in the absence of a subsidy element.

Economic analysis

70. Economic rates of return (ERR) and Net Present Values (NPV) were computed for each region (table 6), as was done at appraisal, using a slightly different methodology to account for the variations between the plans that were made at appraisal and actual implementation (see details in Annex 3). In particular, while at appraisal benefits arising from investments on the uplands and reduced siltation were taken into account, only the incremental

¹⁴ Or about US\$ 400/ha if only areas with reliable water control are taken into account. By way of comparison, irrigation infrastructure rehabilitation projects currently funded by the African Development Bank in Madagascar have a cost per hectare of US\$ 2,000 to US\$ 3,000 and favor concrete coated primary canals on durability grounds.

¹⁵ Morris et al., 2007, p.46.

paddy production in irrigated areas was considered here, in view of the limited results achieved on the uplands. Consequently, only the costs directly related to investments in the irrigated areas were taken into account in this ICR's economic analysis. Also, whereas project benefits and costs were computed on a 20 year period in the economic analysis at appraisal, a 10 year lifespan for project investments was used here, to reflect the much lower intensity of the rehabilitation works that were actually carried out.

71. As regards paddy yields, the same assumption used to assess the PDO achievement (section 3.2) was applied: the average yields that the project claims to have achieved were applied to 30 percent of the schemes area whereas it was assumed that the remaining 70 percent of the schemes still apply traditional technologies and thus have unchanged yields. For Marovoay, the average yield announced by the project (2.6 tons/ha) was applied to 100 percent of the area as it seems realistic and was confirmed during discussions with beneficiaries. For Ankaibe, it was assumed that yields similar to those on other Sava region IWMP rehabilitated schemes would be obtained on 100 percent of the area after the completion of the rehabilitation works by PURSAPS in 2016. The cost of the additional works needed to make Ankaibe perimeter fully usable was factored in.

Table 4 : Summary of economic analysis

Perimeter/Region	PAD		Actual	
	ERR	NPV 10% (2006 US\$ million)	ERR	NPV 10% (2014 US\$ million)
Itasy	20%	6.6	19%	1.1
Marovoay (Boeny)	13%	1.6	-12%	-1.8
Sahamaloto (Lac Alaotra)	8%	-1.4	9%	-0.1
Andapa (Sava), Ankaibe excl.	13%	1.6	5%	-0.4
Overall project, Ankaibe excl.	14%	9.4	7%	-1.1
Ankaibe (Sava)	-	-	27%	5.2
Overall project	14%	9.4	15%	4.1

Source: World Bank 2006, World Bank 2008, authors' calculations (see details in Annex 3).

72. It is interesting to note that though it was not planned at appraisal, the Ankaibe diversion weir and feeder canal construction boasts the highest ERR and enables the project as a whole to display an ERR of 15 percent, just higher than the overall project ERR that had been calculated at appraisal. Moreover, the Ankaibe ERR proves to be very robust against lower than expected yields: even if the average yield on the Ankaibe scheme were not to exceed the baseline yield of 2.5 tons/ha that was observed in the Sava region at the onset of the project, the Ankaibe ERR would still be high at 21 percent, and the overall project ERR above the opportunity cost of capital at 12 percent. Therefore, not only has the Ankaibe diversion weir and feeder canal construction allowed the project to use up its rehabilitation works credits and to gain considerable visibility, but it has also contributed much to its overall economic profitability.

73. Given the limited results in terms of profitability for farmers and the fragility of the economic viability of most of the irrigation schemes, as reflected by the 7 percent ERR without Ankaibe, overall efficiency is rated as *Modest*.

3.4 Justification of Overall Outcome Rating

74. **Rating: *Moderately Unsatisfactory***, based on relevance rated as *High*, PDO and GEO achievement rated as *Modest* and efficiency rated as *Modest*. There is a disconnect here with the rating of the last ISR (*Satisfactory*) that was based on the low quality indicator values provided by the M&E unit.

3.5 Overarching Themes, Other Outcomes and Impacts

75. The proportion of women among the beneficiaries of the sub-projects financed under Components A (Development of Commercial Agriculture) and C (Watershed Development) was relatively high at 44 and 42 percent respectively, and constant through cycles and throughout the project life. In addition, women represented 27 percent of the WUA members supported by the project (details in Annex 2). However, no gender oriented activities were planned under the project, which was a lacuna that should be filled in future similar operations.

3.6 Summary of Findings of Beneficiary Survey and/or Stakeholder Workshops

76. An evaluation by the beneficiaries of the project was carried out by a consultant in December 2014 (SAVAIVO 2014), based on a survey of the participants in 301 intensification, erosion control and afforestation sub-projects (i.e. about 8 percent of total sub-projects under Components A (Development of Commercial Agriculture) and C (Watershed Development)). A vast majority of the beneficiaries (82 percent) indicated that the project had contributed greatly to the resolution of their production constraints and confirmed the validity of the watershed approach. 85 percent rated the technology packages promoted by the project as very appropriate. Only 33 percent agreed with the financing modalities, the main causes of disagreement being the matching grant declining pattern and the sometimes late availability of funds in relation to the cropping calendar. The support services provided by the SPs were judged of high quality by 91 percent of the surveyed OPs, although the insufficient availability of the support agents and low frequency of visits were raised as important issues. Another important issue raised by the beneficiaries was their own involvement, perceived as insufficient, in the identification of their sub-project and the elaboration of its budget. Overall, around 60 percent of beneficiaries indicated they were generally satisfied with the project.

77. As regards project impact, 41 percent of the respondents reported a moderate impact on productivity. The non-adequate control of water was reported as a persistent issue, with only 77 percent of the beneficiaries in the irrigation areas judging their infrastructure as functional at the end of the project against 68 percent before the project. The main changes brought about by the project were felt to be on beneficiaries' capacities (83 percent of respondents), followed by general standards of living (73 percent), household income (72 percent), productivity (56 percent) and food security (53 percent). Only 24 percent of beneficiaries reported greatly improved access to credit at the end of the project. The level of definitive appropriation of the new technologies was estimated at around 70 percent, although the exact impact of the often incriminating high input prices versus beneficiaries' limited financial capacities on the continuation of the use of the technology package after the end of the sub-project remained unclear. The project ripple effect among neighboring farmers was estimated as important by 39 percent of the beneficiaries for intensification sub-projects and 26 percent for anti-erosion and afforestation sub-projects.

78. The surveyed beneficiaries' main recommendations for future similar operations included the need for: (i) more intensive support to the OPs during and after the project in order to further enhance management and organizational capacities; (ii) a more participatory approach to ensure that sub-projects really respond to local priorities; (iii) a better assessment of beneficiaries' financial capacities; and (iv) greater attention to increased access to credit.

4. Assessment of Risk to Development Outcome

79. **Rating: High.** All evaluation reports¹⁶ concur to emphasize the five main weaknesses of the project in terms of the sustainability of its development outcomes.

- (i) The WUAs that were supported by the project have not reached a level of maturity that would enable them to take over the O&M of the rehabilitated schemes¹⁷. Consequently, the amounts collected as water use fees and GER funds will not be adequate to cover O&M needs and this suggests a very substantial risk that the rehabilitation investments may not be maintained, all the more since they were mostly low intensity works thus likely to be subject to relatively rapid degradation. The fact that the FERHA, supposed to take care of non-transferable infrastructure maintenance, is not operational yet is another source of concern.
- (ii) There is also a substantial risk that in the absence of sustainable, affordable and accessible financing mechanisms, part of the technology packages that have been promoted may be partially dropped, in particular the mineral fertilizer component. This would cause the yields to go down to some intermediate level between the baseline and the sub-project level and the reduced profitability would in turn hamper further the water use fees recovery.
- (iii) In most afforestation and pasture improvement sites, the project came to an end without having clarified the responsibilities for the maintenance and future exploitation of the newly vegetated areas.¹⁸
- (iv) As mentioned earlier, one of the main achievements of the project was to considerably enhance the technical capacities of the DRDR in the four regions that participated. The DRDR supervised the field activities implemented by the SPs to establish and consolidate the various OPs both in irrigated areas and on the uplands.

¹⁶ Altec 2014 and MINAGRI 2014.

¹⁷ The AFD funded BV-Lac project in the Lac Alaotra region has demonstrated that a much longer support period, of 10 to 15 years, is needed before a WUA can be considered as standing a reasonable chance of being sustainable, with in particular water use charges recovery rates above 80 percent.

¹⁸ For example, about 1,000 ha were afforested in the Sahamaloto watershed on lands belonging to the State, under an agreement between the Regional Environment Directorate and the IWMP. The works were carried out by a myriad of *Groupements de Gestion Durable des Terres* (GGDT, sustainable land management associations) that were also in charge of maintaining the plantations during their first year. It is likely that most GGDTs were mostly constituted of poor people looking for an immediate income and not interested in longer-term benefits. If longer-term arrangements are not established between the Regional Environment Directorate and local populations for the maintenance and future exploitation of these plantations, there is a very substantial risk that they may not be protected and may disappear soon.

However, the DRDR do not have the resources necessary to conduct the very demanding field work that was done by the SPs despite having been allocated additional means by the Ministry of Agriculture. More time was required for the SPs to bring the OPs to a more advanced level of autonomy at the end of the project than they actually were and to leave them under the more distant supervision of the DRDR. The same applies to the ASCs and the relay farmers that were identified and trained by the project to help promote the improved technologies amongst their peers.

- (v) Finally the uneven but generally low involvement of communal authorities in the project also hampers its sustainability. Had they been more strongly engaged and more committed, the Communes could have continued supporting some of the project activities after its end (support to WUAs and GGDTs, clarification of responsibilities for the O&M of the various investments, extension, land tenure securisation through the maintenance and operation of the *guichets fonciers*, etc.).

80. As mentioned in section 2.5, the PURSAPS will take over some of the tasks needed to consolidate IWMP's achievements. However, it appears that consolidation of IWMP's investments in afforestation and pasture improvement was not included in PURSAPS' mandate, and even for the activities that were, the extent to which PURSAPS will be able to allocate resources to IWMP's results consolidation is not clear yet.

5. Assessment of Bank and Borrower Performance

5.1 Bank Performance

(a) Bank Performance in Ensuring Quality at Entry

81. **Rating: *Moderately Unsatisfactory*.** As seen in section 2.1, the project preparation team made commendable use of rich analyses of previous investment operations in the irrigation sector in Madagascar and the reasons for their historically disappointing performance and the IWMP was anchored into GoM's new strategy for irrigation and watershed development. The choice that was made at design stage to implement the project through the GoM structure, reinforced with TA, proved very relevant. However, some important shortcomings of project preparation were very prejudicial to the attainment of the PDO: (i) preparation overlooked the risk of somehow reverting, during implementation, to some of the shortcomings that had characterized previous irrigation development experiences, in particular too much focus on technical messages with little attention paid to the economic constraints farmers are facing, little effort to differentiate between farmers, insufficient emphasis on critical issues such as land tenure security, access to credit and markets, rural roads, diversification, and human and material resources needed to accompany project beneficiaries on the long-run; and (ii) more importantly, by failing to produce a quality result framework, preparation failed to put the project on a sound track in terms of M&E.

(b) Quality of Supervision

82. **Rating: *Moderately Unsatisfactory*.** Supervision was regular and constructive and helped the project to make substantial progress in a difficult environment. The difficulties

included a 15 month disbursement freeze and high political instability during the transition period until the elections which were eventually held during the final months of the project. In particular, supervision initiated a number of strategic decisions that proved critical to facilitating project implementation (see section 2.2). These decisions included the introduction of the MAPER concept to lift the deadlock created by the original beneficiary compulsory 20 percent upfront contribution to the works, and the recruitment of SPs with international experience and the use of multiannual PCs to turn the project performance around when it was coming out of the disbursement freeze period, having lost all the trust of its intended beneficiaries. Moreover, the choice, in the final years of the project, to use a significant share of the project resources to build one single structure – the Ankaibe diversion weir and feeder canal – was a good decision as demonstrated by the results of the economic analyses presented in this ICR. The team also had an enormous amount of extra work beyond simple supervision due to the delayed approval of the GEF grant, which led to the need for a separate approval process for the latter and for two subsequent restructurings of the IDA-funded project – although the two projects were supposed to be fully blended.

83. Supervision however missed the opportunity to improve the component design. In particular, important issues such as diversification, value chain approach and land tenure securisation appear to have been largely sacrificed on the altar of implementation simplification and disbursement acceleration due to the delays the project had accumulated. Supervision also missed the opportunity to improve the project M&E, in particular in its evaluation dimension, leading to a rather uniform and top-down approach during project implementation and a lack of impact and sustainability indicators at the end of the project (see section 2.3). Follow up on the MTR findings in this regard was insufficient. Inadequate attention was also paid to the quality of the monitoring and final assessment of the various project indicators by the M&E unit, resulting in a substantial number of indicators being largely over-estimated and an over-optimistic rating of project performance (leading to a disconnect between the final ISR and ICR PDO achievement ratings). Finally, supervision also missed the opportunity to trigger the dam safety safeguard in relation to the Sahamaloto dam.¹⁹

(c) Justification of Rating for Overall Bank Performance

84. **Rating: *Moderately Unsatisfactory***, on the basis of the above and taking also into account the fact that the very late entry into force of the GEF grant, approved two years after the project had started, created a considerable amount of disruption in the project implementation (see section 2.2).

5.2 Borrower Performance

(a) Government Performance

¹⁹ Note that at the time of project approval, the project design didn't meet the requirements for OP4.37 to be triggered. OP4.37 has since been refined (in 2011 and 2012).

85. **Rating: *Moderately Satisfactory*.** Overall, the GoM demonstrated relatively high ownership and commitment to the successful implementation of the IWMP. In particular, adequate human resources were assigned to the CelCo and the project always received high management support when needed. However, the GoM's performance is rated *Moderately Satisfactory* in light of the political instability that triggered a prolonged disbursement freeze in 2009-2010 and in light of the lack of additional resources extended to the DRDRs at the end of the project to enable them to continue, consolidate, and possibly expand the project activities.

(b) Implementing Agency or Agencies Performance

86. **Rating: *Moderately Satisfactory*.** The project was implemented in a very dynamic way by the CelCo, the Director of which remained the same throughout the project life. Project implementation through the CelCo and DRDRs within the Ministry of Agriculture, assisted by TA at the national and regional levels, SPs at field level and an external financial management agency, proved to be a very efficient arrangement that was instrumental in taking the project to its end despite the difficult times it went through. In general, the CelCo reacted promptly to the supervision missions' recommendations. Financial management and procurement were rated as *Satisfactory* and *Moderately Satisfactory* throughout most of the project life, both at central and DRDR levels. In addition, the project produced a wealth of documents, reports, leaflets, videos, and other media to publicize its methodology and achievements. However, it failed to produce quality monitoring of the project indicators and impact and sustainability assessments, hence the *Moderately Satisfactory* rating.

(c) Justification of Rating for Overall Borrower Performance

87. **Rating: *Moderately Satisfactory*,** based on the above considerations.

6. Lessons Learned

88. The project did not achieve all its planned outcomes but built a strong basis on which new operations can be (and are being indeed) prepared. The comprehensive nature of the project design and the introduction of innovations for Madagascar (e.g. adoption of new technologies through a phasing out productive investment, performance contract for management of irrigation schemes) imply that achievement of objectives relied on the repetitive testing of approaches, intensive demonstration and capacity building.

89. Regarding institutional arrangements, the project demonstrated that it is possible, and recommended, to rely on the Ministry of Agriculture's structure, reinforced with adequate TA and the support of an external financial management agency, to implement agricultural projects. The use of SPs providing a cadre of experienced field technicians working directly with the beneficiaries proved instrumental in injecting momentum into project implementation and illustrating the way such a project should be implemented at field level. However, GoM should commit greater human and material resources to DRDRs during and after project implementation, and SP support should be designed in the future in such a way as to ensure a progressive phasing out of their intervention while the capacity of DRDRs and of the beneficiary OPs increases. The Project has built the capacity of the Ministry of Agriculture's structures both at the central and regional levels to allow them to ensure overall responsibility for project coordination and management. IWMP's institutional and implementation

arrangements have now served as a model for other Bank-funded projects. Other development partners (AFD, JICA, etc.) are also considering using the same institutional arrangements for their future operations.

90. The project also demonstrated the validity of the integrated watershed approach and the strong interest that beneficiaries take in that approach. It successfully tested a series of tools like WMPs, WDPs, SDPs, etc. However, project results suggest that erosion control/soil conservation interventions in uplands should be allocated greater resources in order to be implemented at scale in order to demonstrate their impact on the downstream areas. In particular, erosion control/soil conservation measures (lavaka stabilization, afforestation, improved pasture management, etc.) should be carried out in a much more systematically and on a larger scale, with the full involvement of the other administrations concerned (Ministry of Environment), and ensuring sustainability through formal maintenance and exploitation arrangements with local populations.

91. As IWMP's comprehensive design was geared towards tackling multiple constraints in a simultaneous fashion within a given watershed, the project ensured that project activities were indeed selected in a manner that ensures that the whole of these actions was more than the sum of the individual parts. Doing so required that the selection of project activities was not just be based on the merits of the individual activity on its own, but on its contribution to the wider agenda pursued by the project in a given watershed.

92. The multiannual PC approach and the MAPER combined with the formalization of *Dina* proved to be useful tools to generate ownership and mobilize the irrigation scheme users and to consolidate their WUAs. This requires a progressive implementation of rehabilitation works which in turn result in a progressive enhancement of the irrigation and drainage service.

93. A clear and objective measurement of the quality of irrigation and drainage service based on objective criteria is warranted in order to closely monitor the service improvements brought by the rehabilitation works. Technical and financial norms related to water control and durability should be defined in this regard by the *Direction du Génie Rural* (Rural Works Directorate).

94. Implementation of the rehabilitation works would be eased if flexible multiannual framework contracts could be used to reduce procurement delays and lower construction cost.

95. In terms of agricultural intensification, the main lesson of the project may be synthesized as "*less emphasis on inputs, enhanced and more adapted support.*" Intensification packages have impressive results when subsidized but they need to be tailored to better respond to the actual farmers' needs. The matching grant approach proved less efficient for agricultural intensification with the exception of its initial demonstration effect. The economy of the targeted farms should be analyzed in a holistic way in order to formulate more adaptive and differentiated support strategies that take into account the constraints the various categories of farmers face (labor and finance availability, technical capacity, land tenure, level of water control, etc.). The ratio of farmers per extension agents need to be reduced. Their reach can be usefully increased by using *relay farmers* and technicians recruited within the OPs. OPs (WUAs, etc.) need to be accompanied in the long run. Commercial farmers and those having

the potential to become commercial farmers should be supported in accessing credit and improving marketing.

96. WUAs have been established as credible partners of the Government in ensuring sustainable irrigation management. The empowerment of WUAs in taking charge of management, operations and maintenance of irrigation systems was defined in a manner that put WUAs truly in the driver's seat, while at the same time ensuring that the interests of all farmers, including tenants, are properly represented. The project was instrumental in updating the irrigation related legal framework with the aim to ensure that participation of tenants in the management, operation and maintenance of irrigation systems is effective. Longer term support is definitely required to ensure their long term viability. Five years is a bare minimum to seriously consolidate these organizations and set them on a viable path.

97. In a context of an ever increasing fragmentation of land in irrigated areas, a strong emphasis should be put on agricultural intensification and diversification in uplands.

98. Communes should be engaged on a systematic way (support to OPs, conflict resolution and clarification of responsibilities for the O&M of the various investments, extension, land tenure management, etc.), incentivized and held accountable for fulfilling their commitments.

99. Land tenure management must be built in as an essential part of any similar project in the future. Tangible results have to be achieved.

100. Future projects should also be more gender sensitive in order to draw on the generally observed dynamism of women and women associations in soil conservation, intensification, diversification, marketing, and processing activities.

101. More attention has to be paid to establishing an adequate M&E system that is able to define and correctly monitor useful output and outcome indicators and that does not neglect the evaluation aspect, in order to provide project management with impact and sustainability assessments that may induce shifts in strategies and resources during the project life.

102. The CelCo of PN-BVPI should play a greater role in coordinating the various initiatives in the field of integrated watershed management, including those being implemented outside the umbrella of the PN-BVPI, and ensuring that experiences are shared and positive results are capitalized upon.

103. Last but not least, greater attention must be paid to transport infrastructure and GoM should ensure that any zone where a project such as IWMP is implemented has an acceptable road and feeder road network that does not negatively affect the terms of trade farmers face.

7. Comments on Issues Raised by Borrower/Implementing Agencies/Partners

(a) Borrower/implementing agencies

104. In its comments, the implementing agency highlighted the challenges faced during project implementation due to the political instability and disbursement freeze. These resulted in dropping some important activities – notably the support to diversification – in favor of

greater simplicity which was necessary in the given conditions to accelerate disbursement. The strengths of the project, including safeguards and fiduciary processes, need to be emphasized as much as its weaknesses. Sustainability suffered from the absence of APL Phase 2. Overall, the client considers that this project deserves a *Satisfactory* rating (see details under Annex 7).

(b) Cofinanciers

105. **Not Applicable.**

(c) Other partners and stakeholders

106. An evaluation regarding of the Irrigation and Watershed Management National Program including the IDA/GEF-funded project object of this ICR as well as two AFD-funded projects was conducted in 2014-2015. The findings of this evaluation are detailed under Annex 8 and are fully consistent with the conclusions of this ICR.

Annex 1. Project Costs and Financing

(a) Project Cost by Component (in US\$ Million Equivalent)

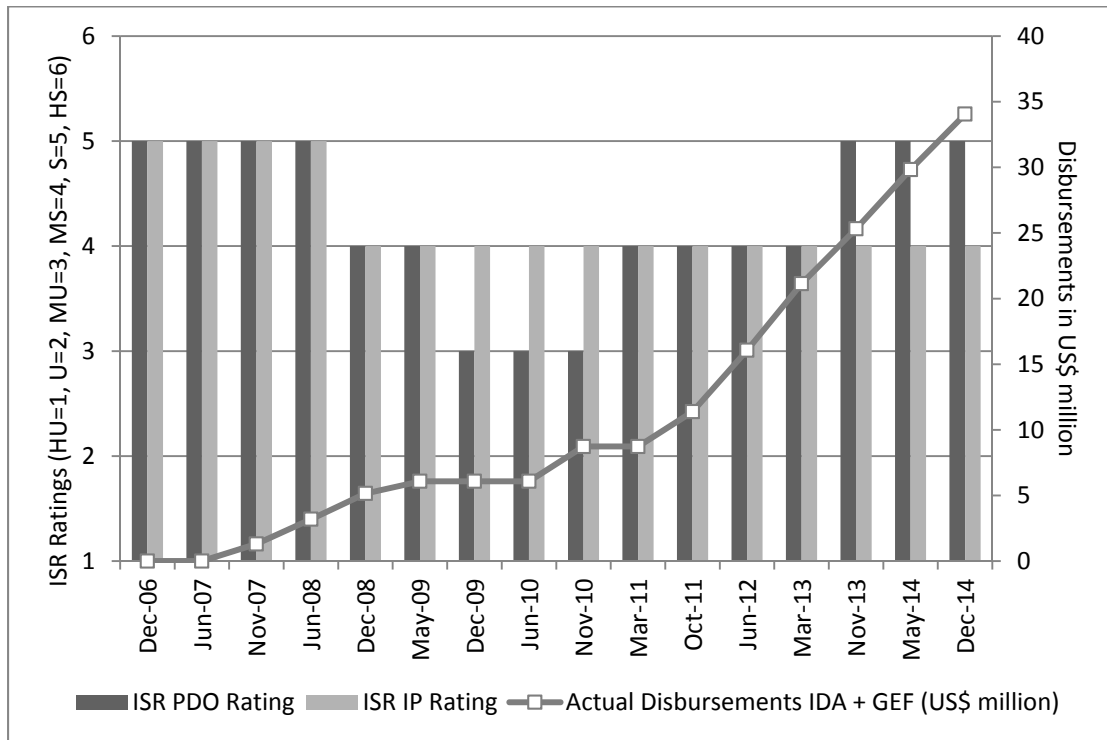
Components	Appraisal Estimate (US\$ million)	Actual/Latest Estimate (US\$ million)	Percentage of Appraisal
A. Development of Commercial Agriculture	12.68	7.97	63%
B. Irrigation Development	17.47	11.46	66%
C. Watershed Development	4.33	6.71	155%
D. Project Management	4.31	9.91	230%
Project Preparation Facility	1.61		
Total Baseline Cost	-		
Physical Contingencies	-		
Price Contingencies	-		
Total Project Costs	40.40	36.05	89%
Total Financing Required	40.40		

(b) Financing (as of December 19, 2014)

Source of Funds	Type of Cofinancing	Appraisal Estimate (US\$ million)	Actual/Latest Estimate (US\$ million)	Percentage of Appraisal
Borrower		0.00	0.00	
International Development Association (IDA)		30.00	28.80	96%
Global Environment Facility (GEF)		5.90 ¹	5.25	89%
Local Communities		4.40	2.00	45%

¹ GEF contribution was estimated at US\$ 6.0 million in the 2006 PAD, then brought down to US\$ 5.9 million in the 2008 GEF Grant Agreement.

Figure 1.1 : Disbursement profile and Implementation Status and Results (ISR) reports ratings



Source: CelCo, World Bank ISR reports.

Annex 2. Project Outcomes and Outputs by Component

Discussion of Program and PDO Level Indicators

1. The project M&E suffered from rather low quality at entry that was not fully corrected later on despite two rounds of improvement (restructurings 1 and 2). In particular, as shown in table 2.1 below, a large number of the program and PDO level results indicators defined at restructuring in 2011 and 2012 did not encompass enough the notions of impact and sustainability but were rather somehow redundant with the component outputs indicators (and in some cases between themselves).

Table 2. 1 : Discussion of program and PDO level indicators

Final Program Level Results Indicators	Comments
1. Average yield of irrigated rice in project-rehabilitated irrigation sites (mt/ha) in the main season;	This is an appropriate measure of the project's impact, however it is influenced by the project outputs e.g. on-going subprojects. This indicator measures sustainability to the extent where final measurement is done after all subsidies provided by the project have been phased out – which was only partially the case at the end of the project.
2. Average yield of rainfed rice in surrounding watersheds (mt/ha);	Idem.
3. Average value of the additional rice production in project-rehabilitated irrigation sites (10 ⁶ Ar/beneficiary/cycle);	It is not clear why this indicator was introduced at restructuring in 2011. Its relevance appears questionable since: (i) it reflects the variation in paddy yields, already captured by program level indicator 1, and in paddy prices, on which the project had no influence ²⁰ , and (ii) it does not capture the incremental cost of inputs and therefore, does not give any indication in terms of cost/benefit analysis.
4. Average yield (mt/ha) of non-rice crops supported by the project;	Idem as program level indicators 1 and 2 above.
Final PDO Level Results Indicators	
1. Area cultivated with improved technologies and/or inputs provided through the project (ha);	This was intended as the total area of intensification sub-projects on irrigated schemes and on uplands. It was therefore more an output indicator than a PDO indicator and, as a measure of the project's improved technology dissemination efforts, was broadly redundant with PDO level indicator 3 below and the output indicator regarding the number of sub-projects financed and implemented. Same comment on sustainability as for program level indicator 1. .
2. Area provided with improved irrigation and drainage services by the project (ha);	It is a measure of the project's impact which is partially redundant with the output indicator regarding the number of water users provided with improved irrigation and drainage services. The definition of "improved services" proved to be challenging (see below).
3. Area cultivated during the dry season in the irrigation schemes targeted by the project (ha and %)	It is a measure of the project's impact, however it does not measure sustainability (what happens after the project stops subsidizing inputs?).
4. Direct project beneficiaries, of which female;	This was intended as the total number of farmers participating in intensification sub-projects on irrigated schemes and on uplands. Same remarks as for PDO level indicator 1.
5. Area under SLM practices in project intervention zones (ha).	Idem as PDO level indicator 3.

Source: World Bank 2012 for indicators; authors' appreciations for comments.

²⁰ However, statistics provided by the *Observatoire du Riz* (paddy and rice price observatory at Prime Minister's Office level) indicate that the price effect may have been limited, paddy prices having varied little over 2011-2014 (intra-annual variations were important, but not inter-annual variations).

2. Regrettably not measured by any program or PDO level indicators: technology spread-out as a result of the demonstrative effect of the sub-projects on irrigation schemes and uplands; impact of the work of the ASCs; impact of the work of the guichets fonciers; impact of the various anti-erosion measures tested on siltation.

Achievement of Program and PDO Level Indicators

3. The APL program outcome indicators and the project outcome indicators were as follows in tables 2.2 and 2.3.

Table 2. 2 : APL program indicators at appraisal

1. Increased average productivity of irrigated rice in the project areas:		
	Baseline (mt/ha)	End of project (mt/ha)
Andapa	2.0	3.5
Marovoay	2.0	3.5
Lac Alaotra	3.5	5.0
Itasy	3.0	4.5
2. Increased average productivity of rainfed rice in project areas:		
	Baseline (mt/ha)	End of project (mt/ha)
Andapa	1.5	2.25
Marovoay	1.5	2.25
Lac Alaotra	1.5	2.25
Itasy	1.5	2.25
3. Non rice area in irrigated schemes as a percentage of overall cultivated area over two seasons increased by 25%;		
4. Area under production in irrigated schemes during the dry season increased by 25%.		

Source: World Bank 2006 (IDA PAD) and World Bank 2008 (GEF Project Brief).

Table 2. 3 : Project indicators at appraisal

Project Outcome Indicators
<ul style="list-style-type: none"> • Dissemination of innovative technologies and equipment to 30,000 beneficiaries through extension, capacity strengthening and targeted cost sharing; • Improved management of about 21,780 ha through investments in rehabilitation, training and institutional reforms; • Improved management of about 8 sub-watersheds through capacity strengthening and investment in watershed infrastructure; • Increased Government support for agricultural intensification in irrigated and rainfed areas through increased public expenditures; • Increase in land area under sustainable management as a percentage of baseline, in targeted project intervention areas (<i>set at 20% in 2008 GEF Project Brief</i>); • Increase in vegetation cover as a percentage of baseline (<i>set at 15% in 2008 GEF Project Brief</i>).

Source: World Bank 2006 (IDA PAD) and World Bank 2008 (GEF Project Brief).

4. Although most of the key development indicators were reportedly achieved at project closure (table 2.4), some of these indicators are marred with uncertainty and others have had a somewhat evolving definition and/or target values. These M&E issues cast some doubts over the reported achievement.

Table 2.4 : Degree of achievement of Program and PDO indicators

Final Program Level Results Indicators	Baseline	Original target (03/2011)	Revised target (12/2014)	Reportedly Achieved (from last ISR)	Actual degree of achievement (from ICR)
1. Average yield of irrigated rice in project-rehabilitated irrigation sites (mt/ha) in the main season;	2.7	4.3 ²¹	4.4	4.4	41%
2. Average yield of rainfed rice in surrounding watersheds (mt/ha);	1.4	2.25	2.6	3.3	Unknown
3. Average value of the additional rice production in project-rehabilitated irrigation sites (10 ⁶ Ar/beneficiary/cycle): Rainy season Dry season	n/a	n/a	0.480 0.620	0.872 0.511	Unknown
4. Average yield (mt/ha) of non-rice crops supported by the project: Maize Beans Potatoes Tomatoes Onions Groundnuts	1.2 0.5 10.0 9.7 18.0 1.7	n/a	1.7 0.8 14.0 14.0 25.0 2.3	Not relevant any longer as diversification activities were dropped	Unknown
Final PDO Level Results Indicators					
1. Area cultivated with improved technologies and/or inputs provided through the project (ha);	0	n/a	5,175	6,122	118%
2. Area provided with improved irrigation and drainage services by the project (ha);	0	21,780	13,362	14,029	50-56%
3. Area cultivated during the dry season in the irrigation schemes targeted by the project (ha and %);	2,403 11%	n/a	4,150 25%	Not relevant any longer as diversification activities were dropped	Unknown
4. Direct project beneficiaries, of which female;	0	n/a	13,130 20%	22,790 27%	69 to 120% 220%
5. Area under SLM practices in project intervention zones (ha).	0	n/a	2,051	3,018	59 to 147% with qualification

Source: World Bank 2012 for baseline and targets; Aide-Mémoire of the last supervision mission, December 8-16, 2014, for reported achievements; authors' appreciations for actual degree of achievement.

5. **Program level indicator 1: Average yield of irrigated rice in project-rehabilitated irrigation sites: 4.4 mt/ha. Degree of target achievement: 41%.** The average yields that the project claims to have achieved are, in all regions but Boeny, extremely high given the relatively low level of technology most farmers in the participating schemes are still using. While yields observed on intensification sub-projects (table 2.5) sound realistic and are consistent with anecdotal evidence gathered during field visits, yields outside the sub-projects in all sites but Marovoay (Boeny) appear to be over-estimated, especially in view of the fact that not all farmers on the irrigation schemes have adopted the new technologies demonstrated in the sub-projects (and when they have, it is in most cases without the fertilizer component).

²¹ Baseline and original target are a weighted average of the site specific target yields provided in the PAD.

The farm level financial returns from the intensification packages disseminated by the project on the irrigated schemes and on the watershed areas were not sufficiently attractive to ensure a widespread uptake of the new technologies, as demonstrated by the high drop-out rate between Year 1 and Year 3 of the subprojects cycle as subsidies were phased out and further confirmed by the financial analyses included in this ICR. In addition, all the rehabilitation works that were planned could not be fully completed (see Appendix 2), leaving the irrigation and drainage services below the quality standard required to allow the adoption of the full intensification packages by the farmers on the entirety of the irrigation schemes area. It is doubtful that yields could go up from about 3.1 mt/ha to 5.1 mt/ha on average (in the three regions excluding Boeny) with such limited use of fertilizer and average rehabilitation costs of US\$ 175/ha only. In Boeny the data looks more realistic.

Table 2. 5 : Project results in terms of paddy yields (mt/ha)

	Itasy	Sava	Boeny	Lac Alaotra	Project
Baseline	2.8	2.5	2.1	3.5	2.7
PAD objectives	4.5	3.5	3.5	5.0	
Objective at 2 nd restructuration					4.4
Reported results 2013/14					
On intensification sub-projects	6.3	5.8	4.4	6.8	5.8
Outside sub-projects	4.8	5.0	2.5	5.0	4.3
Overall	4.9	5.0	2.6	5.2	4.4
ICR estimates	3.4	3.3	2.6	4.0	3.4

Source: World Bank 2006, World Bank 2012, MINAGRI 2014, authors' calculations (see Annex 3).

6. However, the ICR mission could not identify a priori any methodological shortcoming that could have led to over-estimated yields, to the extent that the guidelines that were elaborated by the project to measure paddy yields were applied correctly²². It will be important to continue monitoring the yields on the schemes that benefited from the IWMP as the results will necessarily influence the design of any similar future operation.

7. According to the project management, the reasons accounting for the lower yields observed in Boeny (Marovoay scheme) were threefold: (i) high incidence of sharecropping in Marovoay that limited interest for intensification; (ii) the fact that at the time of the yield survey (2013), works were still on-going in the sector 4, and that most of the downstream part of that sector was affected by bad water control due to drainage issues; and (iii) the fact that the works planned for 2013 in the sector 10 had been postponed (and will be taken care of by PURSAPS in the near future, see Appendix 2). On the other hand, Marovoay could well be the only region where the yield gains announced by the project reflect the reality of the project's results. Indeed, in contrast with the other regions, Marovoay was the only region where the

²² Guidelines for paddy yield surveys were elaborated by the project (CeCo BVPI, undated) based on the *carré de rendement* method (square meter method, enumerator harvesting sample squares in randomly chosen plots). The guidelines stipulated that to estimate yields outside the sub-projects, the survey had to be carried out on plots of farmers that had never taken part in a sub-project before. The extent to which this was respected could not be verified with precision.

beneficiaries and technicians met by the ICR mission concurred with the project announced yields²³.

8. Although the average yields in the project area have undoubtedly increased, the extent of this increase is therefore likely to be lower than reported by the M&E system. Farmers and technicians in all three regions visited by the ICR mission (Itasy, Boeny and Lac Alaotra) concurred that 25 to 40 percent of the irrigated schemes area is now cultivated using the technologies introduced by the project, with the exception of fertilizers. The average yields that the project claims to have achieved were therefore applied to 30 percent of the schemes area whereas it was assumed that the remaining 70 percent of the schemes still apply traditional technologies and thus have unchanged yields. Under this scenario, the average yield at the end of the project would be 3.4 tons/ha, giving a 41 percent achievement of the objective of an increase from 2.7 to 4.4 tons/ha.

9. **Program level indicator 2: Average yield of rainfed rice in surrounding watersheds: 2.6 mt/ha. Degree of target achievement: Unknown.** The yield reported by the project was measured at Andapa only, and on sub-projects only (hence not really “average yields in surrounding watersheds” as specified in the indicator formulation).

10. **Program level indicator 3: Average value of the additional rice production in project-rehabilitated irrigation sites: Ar 0.480 million/beneficiary/cycle in the rainy season and Ar 0.620 million/beneficiary/cycle in the dry season. Degree of target achievement: Unknown.** Here again, the values reported by the project were calculated on sub-projects only (hence not really “average value of the additional rice production in project-rehabilitated irrigation sites” as specified in the indicator formulation).

11. **Program level indicator 4: Average yield of non-rice crops supported by the project: maize 1.7 mt/ha, etc. Degree of target achievement: not known.** This indicator was not followed any longer after diversification activities were discontinued. The original focus on crop diversification was lost in the course of project implementation, while this is a critical component of irrigated agriculture viability in the context of an always increasing fragmentation of the land.

12. **PDO level indicator 1: Area cultivated with improved technologies and/or inputs provided through the project: 5,175 ha. Degree of target achievement: 118%.** Total area of intensification sub-projects amounted to 6,122 ha (5,456 ha on irrigated schemes and 666 ha on uplands). This indicator was introduced at the first restructuring with a target value of 4,050 ha, target which was later increased to 5,175 ha at second restructuring when the GEF funds were made available (and IDA funds consequently reallocated to Component A which supports this indicator). There was no explanation provided for the original target value introduced at first restructuring. Another indicator related to the “dissemination of innovative technologies and equipment to 30,000 beneficiaries” was dropped at first restructuring. However, the latter indicator still appears in the revised result framework as “number of direct project beneficiaries” and it is commented below (PDO level indicator 4).

²³ On Sahamaloto perimeter (Lac Alaotra), the estimation of the water users’ representatives met during the ICRR mission was that the average yield on the entire perimeter had gone up from 3.5 mt/ha to about 4 mt/ha with the project (versus 5.2 mt/ha according to the project M&E unit).

13. ***PDO level indicator 2: Area provided with improved irrigation and drainage services by the project: 13,362 ha. Degree of target achievement: 50 to 56%.*** The reported achievement for this indicator was not properly measured. This indicator was meant to measure the area with reliable water control. The original target in the PAD was set at 21,780 ha (total area of the irrigation schemes targeted by the project, which was later revised to 20,000 ha – see Appendix 2). However, the baseline value was set at zero, while the area with reliable water control was later reported to have been estimated at 5,058 ha before the project start. This new baseline was introduced after the SPs were mobilized and started monitoring the quality of the irrigation and drainage services in a participatory manner with the water users. The definition of “area with reliable water control” was that irrigation water could be brought to the fields and excess water could be drained at will by the farmer. In some instances specific criteria were defined with the water users to characterize the quality of service (using for example the date of the first irrigation in the cropping season²⁴). Although the methodology to measure the reliability of water service was not fully consistent across the various project sites, it is considered that it still gives a fairly reliable picture of the situation of the schemes. Considering the baseline value of 5,058 ha, the real outcome of the project would hence be an increase of 8,971 ha in the area with reliable water control, to be compared with the original target of 15,000 ha (after deducting the baseline value) and a revised target of 13,362 ha. This would be a 60 and 67 percent achievement compared to original and revised target.

14. However, this may still be an over-optimistic assessment given the very low intensity and geographical dispersion of the rehabilitation works that were carried out under IWMP and knowing that rehabilitation works were only partially implemented due to delays in studies, beneficiaries’ contribution mobilization (especially before the introduction of the MAPER in 2011), tenders and works (see Appendix 2). Given that of the total proposed investment in irrigation scheme rehabilitation (Ankaibe weir excluded), only about 30 percent had been spent at project closure (see Annex 3), and assuming a proportional result, it could be argued that a conservative estimation of this indicator would be 30 percent of the 15,000 ha not having reliable water control at the beginning of the project, i.e. about 4,500 ha. This would give an achievement of 30 and 34 percent respectively against the original and revised targets.

15. The Ankaibe weir is a special case since it allowed the project to bring a 2,100 ha scheme back under irrigation. Although the area with reliable water control after construction of the weir is not known for sure, since additional small remedial works are required within the scheme which had not been operational for the past several years, the construction of the weir was a major breakthrough to bring this scheme back to life and to restore hope within the users. Although anecdotal, it is worth mentioning that the President of the Republic himself inaugurated the Ankaibe weir. Based on the respective construction cost for the weir and for the remedial works within the schemes²⁵ it could be considered that 90% of the target is

²⁴ The first irrigation is an important parameter for the farmers since it defines the entire cropping schedule.

²⁵ Ankaibe weir: 15.1 million Ar; remedial works: 1.1 million Ar (see Appendix 2).

achieved for these 2,100 ha. This would result in an additional 800 ha to be added to the area with reliable water control (a 5 percent addition).

16. One further consideration related to the rehabilitation works is that the scope of works, although limited (only 30% of planned investment was spent at project closure), was very well targeted thanks to the participatory planning process supported by the SPs. Farmers had to contribute a percentage of the rehabilitation works and made sure to only pay for those works that were the most vital to improving the quality of service. Hence it is believed that the area with reliable water control is not directly proportional to the rehabilitating budget disbursement rate.

17. Considering all of the above, the range of achievement for this indicator is 35 – 65 percent of the original target with a lower probability for the lower part of the range. The achievement value for the indicator “area provided with improved irrigation and drainage service” is finally set at 7,500 ha by the ICR team being 50 percent of the original target value of 15,000 ha and 56 percent of the revised target value.

18. ***PDO level indicator 3: Area cultivated during the dry season in the irrigation schemes targeted by the project: 4,150 ha (25%). Degree of target achievement: not known.*** Introduced originally as program level indicator 4, this indicator was not followed any longer after diversification activities were discontinued, although it does not specifically refer to diversification areas. Besides, this indicator, if measured, would likely be more influenced by the annual hydrological conditions determining the water availability in dry season than by the impact of the project.

19. ***PDO level indicator 4: Direct project beneficiaries, of which female: 13,130, 20%. Degree of target achievement: 69 to 120%, 220%.*** The achievement for this indicator was not properly measured. Firstly, a much higher target value could be derived from the original PAD which refers to the dissemination of innovative technologies and equipment to 30,000 beneficiaries. Secondly, the correct achievement value for this indicator which was meant to measure the number of beneficiaries of intensification sub-projects should be 15,725 (12,331 in irrigated areas and 3,394 on uplands), of whom 44 percent female as reported under intermediate results indicator 2. We have therefore a 52 percent achievement against the original target and a 120 percent achievement against the revised target. Regarding the participation of women we find a 220 percent achievement rate. Instead, the project management team chose to use the total number of users of the irrigation schemes (22,790 people) as a proxy indicator for the project total number of beneficiaries, on the assumption that most beneficiaries of activities on uplands also cultivate in the irrigated areas. Since not all users of the irrigations schemes have actually benefited from the project, as explained above, the ICR team decided to use the original definition. However, the original target appear to be unrealistic and should be corrected to reflect the total number of scheme users, which leads to a revised achievement rate of 69 percent against the original target. The range for the achievement rate is therefore 69 to 120 percent for respectively the original and revised targets.

20. ***PDO level indicator 5: Area under SLM practices in project intervention zones: 2,051 ha. Degree of target achievement: 59 to 147%.*** The area under SLM practices at the end of the project (3,018 ha) is made up of the area of the intensification sub-projects on uplands (666 ha) and that of afforestation sub-projects (2,352 ha). The degree of target achievement is therefore 59 percent against the original target introduced at first restructuring

(5,100 ha) and 147 percent against the revised target from second restructuring (2,051 ha). The reduction of target area between first and second restructuring was not explained in the Restructuring Paper²⁶. The original target from the PAD was expressed as a percentage increase of the area under SLM (target: 20 percent) and a similar percentage increase of the area under vegetation cover (target: 15 percent), but the baseline is not known and no comparison with the original PAD target can be made. If the baseline areas were small, it may be the case that original PAD targets are exceeded.

21. However, this achievement is very modest when compared to the watershed total area (less than 5 percent), and there is no indication that long term, viable arrangements are in place for long term watershed management and maintenance of the erosion control and afforestation works implemented by the project (a large portion of the newly afforested land is in fact Government land²⁷). In addition, the drop-out rate for under-cover cultivation sub-projects on uplands was 100 percent between Year 1 and Year 3, evidencing the lack of interest of farmers for this SLM technique.

Achievement of Project Intermediate Results Indicators

22. **Component A – Development of Commercial Agriculture.** The objective for this component was *to lay the foundations for improved market access and sustainable intensification and diversification of irrigated and rainfed agricultural systems in the project's watersheds*. It was planned that the component would include the project area as a whole, both irrigated and upland areas, and would achieve its specific objective through an approach focused on market-driven demand, agricultural technology development and dissemination, private sector initiative and vertical integration of supply chains, as well as promotion of partnerships among stakeholders (including public-private partnerships, PPP). The component aimed at improving, all along the targeted supply chains:

- Access to market and marketing systems in order to reduce costs and increase farm gate prices;
- Added value through diversification into higher added value products and agro-processing;
- Capacities of farmers, farmers groups and professional organizations;
- Agricultural productivity through better access to extension, improved technology, inputs, and credit.

²⁶ We would have expected an increase since the GEF funds were reintroduced in the overall project budget at the second restructuring.

²⁷ For example, about 1,000 ha were afforested in the Sahamaloto watershed on lands belonging to the State, under an agreement between the Regional Environment Directorate and the IWMP. The works were carried out by a myriad of *Groupements de Gestion Durable des Terres* (GGDT, sustainable land management associations) that were also in charge of maintaining the plantations during their first year. It is likely that most GGDTs were mostly constituted of poor people looking for an immediate income and not interested in longer-term benefits. If longer-term arrangements are not established between the Regional Environment Directorate and local populations for the maintenance and future exploitation of these plantations, there is a very substantial risk that they may not be protected and may disappear soon.

23. The component included two sub components: one involving activities that largely depended on public/collective initiative; the other one depending essentially on demand from stakeholders:

- (i) **Support to agricultural services.** The sub-component aimed at improving access to markets and supporting the development of commercial agriculture value chains, through innovative technologies for production, storage and processing, and a stronger enabling environment at the site level. It was planned that activities would be adjusted to specific needs of each site, and would include the following: (a) support to the development of dynamic market-driven supply chains, particularly by creating and strengthening links between producers and markets, (b) building up of farmers capacities and strengthening professional organizations, as well as establishing Agricultural Service Centers (ASC), and (c) dissemination of technologies for agricultural intensification and diversification, including support and advisory services for the implementation of agroecological and agroforestry techniques in the upper parts of the watersheds. These services would be provided by strategic partners and specialized service providers.

- (ii) **Support to private investment.** It was planned that this sub-component would provide demand-based support to private investment by operators, farmers and farmer groups at all levels of the agricultural activity. The sub-projects funded under this sub-component would be essentially private in nature and would be initiated upon request by a farmer, a farmer group or a private sector operator, with financial support from the project if Government considered them a priority and wanted to promote them. Project support would be provided to priority new investments through a cost sharing mechanism according to a pre-established positive/negative list. Sub-projects considered could include investment in collective storage, market research and supply chain development, technical and managerial advisory services, new technology demonstration and dissemination (including agro-ecological cultivation techniques), support to seed production, private distribution networks for inputs and equipment and microfinance institutions, and support to contract farming and integrated sub-projects initiated by commercial or agro-industrial partners and involving small scale producers. The project would take a gender sensitive approach and would specifically support vulnerable groups in their demands. In addition to investment in infrastructure and equipment, it was planned that sub-projects could include studies and market tests and research, extension and advisory services, applied research, training, and study tours.

24. Due to the late entry into force of the GEF grant that prompted a reallocation of funds from Components A and B to Component C and the delays accumulated because of the disbursement freeze, it was decided to drop some very important elements of Component A, such as support to the development of dynamic market-driven supply chains, support to diversification and support to non-farm investment projects (upstream and downstream investments, microfinance, etc.); at the end, having concentrated on agricultural intensification (with the exception of the support extended to ASCs), Component A as it was implemented is the only one that looks very different from what was envisaged at appraisal and made explicit in its name (Development of Commercial Agriculture). Table 2.6 shows the degree of achievement of intermediate outcome indicators.

Table 2. 6 : Degree of achievement of intermediate outcome indicators for Component A

	Baseline	End of project target (2014)	Reportedly Achieved (from last ISR)	Actual degree of achievement (from ICR)
1. ASC established and functioning;		5	5	100%
2. Clients who have adopted an improved agricultural technology promoted by the project:				
on irrigated schemes	0	25,300	29,982	20 to 30%
on uplands	0	6,830	5,010	
3. Sub-projects financed and implemented;	0	1,560	1,935	124%
4. Technologies demonstrated by the project.	0	6	8	133%

Source: World Bank 2012 for baseline and targets; Aide-Mémoire of the last supervision mission, December 8-16, 2014, for reported achievements; authors' appreciations for comments.

25. **Intermediate results indicator 1: 5 ASC established and functioning. Degree of target achievement: 100%.** Four ASCs (Miarinarivo, Andapa, Marovoay and Amparafaravola) were established and supported by the project that provided for offices, equipment and running expenses in their first year (2008). A fifth ASC (Soavinandriana) only benefited from training. ASCs played an important role in collecting and making available to farmers input and output prices in their respective region. However, it appears that their impact in terms of linking farmers to suppliers, produce collectors and finance institutions was much more limited than planned and that most of their intermediation activity consisted in assisting farmers to organize themselves in order to access the project services. In addition, some ASCs suffered from erratic funding from the Ministry of Agriculture, while others apparently did not²⁸, for a reason that the ICR mission could not fully clarify (some element of performance was reportedly taken into account in the budget attribution process, but precise decision criteria could not be found).

26. **Intermediate results indicator 2: 25,300 farmers have adopted an improved agricultural technology promoted by the project on irrigated schemes and 6,830 on uplands. Degree of target achievement: Unknown.** The number of subproject beneficiaries was 15,725 (12,331 in irrigated areas and 3,394 on uplands). The targets for this indicator were calculated based on the assumption that each participant to a sub-project would induce the adoption of the technology by a follower farmer. In the absence of a field survey to assess that ripple effect, the same assumption was used to produce the end of project values that thus remain very theoretical. Strangely enough, both the target and the achieved figure for the irrigated areas exceed the total number of farmers on the participating schemes (22,790). Considering the large dropout rate between years 1 and 3 of the subprojects as input subsidies were phased out, it is highly unlikely that a large proportion of scheme users have adopted the improved technologies. Based on anecdotal evidence reported during the ICR mission we

²⁸ For example, the history of funding the ASC in Itasy experienced throughout the project life was as follows: 2008: funding by the project; 2009: running costs (including salaries) funded by Government, but funds available only in the 4th quarter; 2010: only half budget received, also in the 4th quarter; 2012-2013: no budget at all; 2014: a one-year budget received in October; 2015: at the time of the ICRR mission's visit (end of February), the ASC had not received its budget yet. By contrast, the ASC in Lac Alaotra region did not report any financing problem.

consider that 25 to 40% of the schemes area is cultivated using improved techniques (without the fertilizers – see comments made on the indicator related to paddy yields). This same range could be applied to the number of farmers who have adopted an improved technology, thus resulting in a 5,700 to 9,100 range value. The range of achievement rate is therefore between 20 and 30 percent (applicable to both original and revised target values which were similar – 30,000 people in PAD under the indicator “Number of beneficiaries having benefited from innovative technologies and equipment” and 32,130 people after second restructuring).

27. **Intermediate results indicator 3: 1,560 sub-projects financed and implemented. Degree of target achievement: 124%.** The project financed a total of 1,935 sub-projects (counted as cycle 1 only), of which 1,508 on irrigated schemes and 427 on uplands.

28. **Intermediate results indicator 4: 6 technologies demonstrated by the project. Degree of target achievement: 133%.** Eight technologies were demonstrated: improved seed, SRI, SRA, hybrid seed, granulated urea, under-cover cultivation, nursery management and field management.

29. **Component B – Irrigation Development.** This component aimed to lay the foundations for improved management, maintenance and sustainability of irrigation services provision in four large-scale irrigation schemes through rehabilitation of irrigation infrastructure, capacity strengthening of stakeholders and clarification of roles and responsibilities, and establishment of an appropriate incentive framework. By doing so the component would thus put in place a more favorable environment for agricultural intensification and diversification.

30. It was planned that the project would adopt a contractual approach that would empower stakeholders and clarify their respective roles, based on the principle that investments in infrastructures enhance and at the same are conditioned by the performance of stakeholders. To that end, it was planned that Performance Contracts (PC) would be signed between WUAs, regional directorates for rural development (*Directions Régionales du Développement Rural*, DRDR) and local authorities (Communes) that would specify mutual rights and responsibilities. Investments would be allocated competitively among the four sites, providing more resources to sites where targets were more ambitious and where key indicators were being met.

31. Specifically, the project would finance the following sub-components:

- (i) **Support to irrigation development.** The project would support the participatory preparation of Scheme Development Plans (SDP) and annual PCs, negotiated between WUAs, the DRDR and the Communes, as part of broader Watershed Master Plans (WMP). The SDPs and PCs would provide the overall framework for support to irrigated agriculture, including possible investments in the rehabilitation of irrigation infrastructure. The project would also support stakeholders during implementation of the PC, through capacity strengthening, mobilization of water users, annual evaluation of performance indicators and user satisfaction surveys. Studies would be conducted, among others, into O&M costs and hurricane damage to irrigation infrastructure.

- (ii) **Irrigation investments.** The project would support the rehabilitation of irrigation and appurtenant infrastructure, including technical design studies, implementation of works, and their supervision. As many as possible of these contracts would be co-signed by WUAs. Investments would be determined in a competitive way between the sites, with those sites performing better (in terms of O&M cost recovery and DRDR expenditures for irrigation) benefiting from higher investment levels. It was proposed that the project would also promote low-cost individual irrigation technologies. Eligibility criteria for support under this component would include pre-project recovery levels for overall O&M costs, existence and functioning of a WUA, and current Government (including DRDR and Communes/Districts) expenditure levels in support of irrigation.

32. Table 2.7 shows the degree of achievement of intermediate outcome indicators.

Table 2.7 : Degree of achievement of intermediate outcome indicators for Component B

	Baseline	End of project target (2014)	Reportedly Achieved (from last ISR)	Actual degree of achievement (from ICR)
5. Water users provided with improved irrigation and drainage services;	0	20,278	21,290	40%
6. Operational WUAs;	0	78	88	113%
7. O&M covered with collected fees (million Ar);	0	540	605	53%
8. FERHA established in one region.	No	Yes	No	0%

Source: World Bank 2012 for baseline and targets; Aide-Mémoire of the last supervision mission, December 8-16, 2014, for reported achievements; authors' appreciations for comments.

33. **Intermediate results indicator 5: 20,278 water users provided with improved irrigation and drainage services. Degree of target achievement: Target and achievement dubious.** According to the result framework as revised in 2011 and 2012, improved irrigation and drainage was to be measured through two indicators: (i) an area indicator at PDO level (target: 13,362 ha), and (ii) a number of beneficiaries indicator at intermediate outcome level (target: 20,278). The final value for the latter was derived from a theoretical calculation rather than a field survey: it was assumed that since the target was 20,278 beneficiaries on 13,362 ha, an estimated area of 14,029 ha with reliable water control at the end of the project implied a number of 21,290 beneficiaries. However, it appears that the two target figures, 20,278 beneficiaries and 13,362 ha, were marred by inconsistency from the beginning since there are in total 22,790 water users for 20,051 ha on the participating irrigation schemes. Both the target and the calculated achievement for this indicator are thus to be considered dubious.

34. In addition, a number of 21,290 beneficiaries would actually sound very unrealistic since it would mean that over 90 percent of the total number of water users (22,790) would now enjoy reliable water control, which is definitely not supported by the evidence gathered during the field visits for this ICR.

35. The area with reliable water control is estimated by this ICR to have increased by 7,500 ha (see above comments on project development indicator 2). Based on an average of 0.9 ha per farmer for the four project sites (22,790 farmers on 20,051 ha – see Appendix 1),

the number of beneficiaries from improved irrigation and drainage services could thus be estimated at about 8,300, leading to a 40 percent achievement rate against the target.

36. **Intermediate results indicator 6: 78 operational WUAs. Degree of target achievement: 113%.** Operational WUA was defined as the fact of having an internal regulation and a budget. Sustainability remains however at risk: the AFD funded BV-Lac project in the Lac Alaotra region has demonstrated that a much longer support period, of 10 to 15 years, is needed before a WUA can be considered as standing a reasonable chance of being sustainable, with in particular water use charges recovery rates above 80 percent. Water Users Associations have thus been established as credible partners of the Government in ensuring sustainable irrigation management, but further support is definitely required to ensure their long term viability.

37. Though it was not a project indicator, it is worth noting that women represented 27 percent of the WUA members supported by the project (table 2.8).

Table 2.8 : Women representation in WUAs and WUAs boards

Region	WUA members			WUA board members			Titles
	Total	Of whom women	%	Total	Of whom women	%	
Itasy	6,628	1,193	18%	403	11	3%	1 Vice-President, 2 Treasurers, 4 Secretaries, 1 Irrigation Network Supervisor, 2 Delegates, 1 Councilor
Sava	6,029	2,291	38%	84	3	4%	Treasurers
Boeny	4,010	1,243	31%	166	7	4%	Members
Alaotra	6,123	1,347	22%	113	11	10%	1 Vice-President, 2 Secretaries, 4 Treasurers et 4 Auditors
Total	22,790	6,074	27%	766	32	4%	

Source: CelCo.

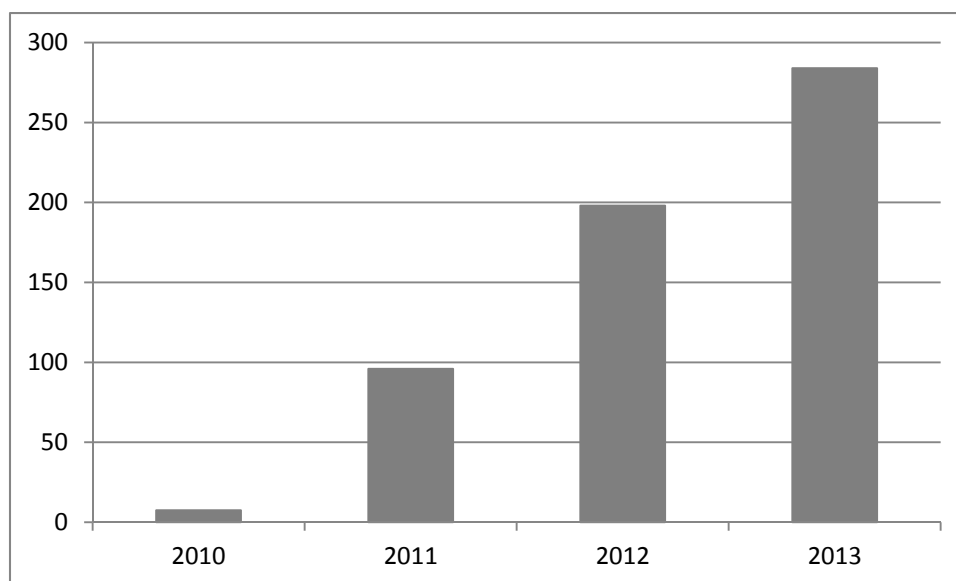
38. **Intermediate results indicator 7: Ar 540 million collected as O&M fees. Degree of target achievement: 53%.** When this indicator was revised at the second restructuring in 2012, the amount of fees collected was deemed more appropriate than their percentage of the total O&M needs. Yet, the amounts of fees collected remained far below total needs estimates throughout the project life. Indeed, although irrigation service fees collected increased 30-fold during the project life (figure 2.1), they are still insufficient to cover basic O&M costs, as illustrated in table 2.9.

Table 2.9 : Achievements in terms of irrigation O&M fees collection, Ar million, 2013/14

	Itasy	Andapa	Marovoay	Sahamaloto	Total
Objectives	129.1	51.6	86.8	191.0	458.5
Realizations					
In cash	49.1	27.5	27.1	69.0	172.7
In labor	102.9	nd	8.0	0	110.9
Total	152.0	27.5	35.1	69.0	283.6
Percentage of realization	118%	53%	40%	36%	62%

Source: MINAGRI 2014.

Figure 2. 1 : Evolution of irrigation O&M fees collected (cash and labor), Ar million



Source: CelCo.

39. In addition, it must be noted that the achievement relative to this indicator was not properly assessed by the project M&E unit. While the indicator was intended to be a measure of water users' annual contribution to routine O&M, both in cash and labor, the project M&E unit actually indicated the cumulative amount of cash O&M fees collected by the WUAs over 2010-2014. The right achievement for this indicator should read Ar 284 million, as indicated in table 2.3 above, and the degree of target achievement is therefore 53 percent.

40. Several factors account for WUAs' weak capacity to collect O&M fees: (i) first of all, the boost given to the elaboration of the PCs in 2011/12 following the recruitment of the SPs raised a lot of expectations in terms of rehabilitation works (hence the strong increase in the amount of fees collected in 2012) that were later partly disappointed, only a minor part of the works planned in the PCs and the corresponding studies having been eventually implemented (see section 3.3 and Annex 2 Appendix 2); water users that did not see any major improvement in their level of water control were reluctant to go on contributing; (ii) the permanence, though illegal, of sharecropping arrangements on some perimeters, especially in Marovoay, renders the collection of fees more complicated; (iii) although signatories of the PCs together with the WUA and the DRDR, most communes did not assume a leading role in sensitizing WUA members on the merits of O&M fees, resolving conflicts and enforcing the WUA *dina* (internal regulation) amongst all their members, especially bad payers; and (iv) some water users complained about the lack of transparency in the management of the fees collected. It is reported that fee collection has regressed since the end of the SPs' mission (June 2014), but the ICR mission could not ascertain this fact.

41. **Intermediate results indicator 8: FERHA established in one region. Degree of target achievement: 0%.** The project supported the revision of the Law 90-016 regarding the management, maintenance and police of the irrigation networks. The new Law 14-042 that in

particular provides for the establishment of FERHA at national and regional levels was finally adopted by the Parliament in December 2014 and promulgated in January 2015.

42. **Component C – Watershed Development.** The objective of the component was *to lay the foundations for sustainable management of watersheds including irrigated and rainfed agriculture, the conservation of the natural heritage, and improved productivity of the natural resources.* It was planned that an integrated and participatory approach to watershed management would be adopted to make rural populations more accountable and encourage them to manage land and natural resources on a more sustainable manner. The component would contribute to: (i) protect watersheds by reducing erosion and sedimentation; (ii) increase the productivity and sustainability of agricultural production based on agroecological and agroforestry technologies; and (iii) strengthen the management of natural resources to improve the environment and living conditions. The component would concentrate on investments with long-term environmental impacts, and support to SLM groups.

43. This component included the following sub-components:

- (i) **Planning and capacity building for sustainable management of watersheds,** including (a) preparation, as part of Watershed Master Plans (WMP), of Watershed Development Plans (WDP) in the four project areas; (b) preparation of participatory plans for managing approximately eight sub-watersheds (each of about 10-500 km²); (c) support to communication and negotiation platforms, (d) training and capacity strengthening of SLM groups; and (e) support to improvement of land tenure security;
- (ii) **Sustainable investments in watersheds,** including (a) determining, through participatory negotiations, local strategies for controlling erosion, arresting gullies and reducing the sediment load of river runoff. The project would finance investments in strategic anti-erosion works (through, among others, biological methods); and (b) interventions, through matching grants, on communally owned land to improve plant cover, reforestation and pastures through strengthened technologies and management transfer of natural resources. Eligibility criteria for support under this component would include the severity of land degradation, and the willingness of stakeholders to cover part of the associated investment costs.

44. Table 2.10 shows the degree of achievement of intermediate outcome indicators.

Table 2. 10 : Degree of achievement of intermediate outcome indicators for Component C

	Baseline	End of project target (2014)	Reportedly Achieved (from last ISR)	Actual degree of Achievement (from ICR)
9. WMP developed;	0	4	4	100%
10. Sub-watershed management plans developed and signed;	0	13	17	130%
11. Beneficiaries adopting SLM;	0	2,400	18,645	59% ^s
12. Anti-erosion measures implemented (mechanical measures);	0	64	117	81 - 183%
13. Reforestation success rate;	n/a	80%	79%	99% with qualification
14. Operational <i>guichets fonciers</i> .	0	5	5	100% with qualification

Source: World Bank 2012 for baseline and targets; Aide-Mémoire of the last supervision mission, December 8-16, 2014, for reported achievements; authors' appreciations for comments.

45. **Intermediate results indicator 9: 4 WDP developed. Degree of target achievement: 100%.** The four WDPs were formulated in 2007/08 together with the SDPs and validated by all stakeholders.

46. **Intermediate results indicator 10: 13 sub-watershed management plans developed and signed. Degree of target achievement: 130%.** The objective was exceeded due to the fact that the DRDR in Itasy chose to establish a sub-watershed management plan for each perimeter or cluster, without increasing the total area covered by these plans. As a result, the distribution of sub-watershed management plans across regions was as follows: Itasy: 8; Sava: 3; Boeny: 3; and Alaotra: 3. At the level of each sub-watershed, a *Comité de Gestion* (COGE, management committee) was organized, in charge of establishing and implementing the sub-watershed management plan.

47. **Intermediate results indicator 11: 2,400 beneficiaries adopting SLM. Degree of target achievement: 59 percent.** A total of 18,645 beneficiaries (3,394 for intensification sub-projects on uplands and 15,251 for afforestation sub-projects) was recorded in the last ISR. This high number reflects the success of the 2013/14 afforestation campaign especially in Sahamaloto watershed. However, afforestation project beneficiaries who were paid to do the work were not really "beneficiaries adopting SLM". Moreover, a substantial number of farmers amongst the 3,394 beneficiaries of intensification subprojects did not really adopt SLM either. The drop-out rate for under-cover cultivation sub-projects that represented 58 percent of subprojects on uplands was 100 percent between Year 1 and Year 3, evidencing the lack of interest of farmers for this SLM technique. Even if we assume a 100 percent adoption rate for other types of subprojects on uplands from the 42 percent remaining subprojects, we derive an actual value of 1,425 farmers which represents a 59 percent achievement rate and is certainly a maximum.

48. **Intermediate results indicator 12: 64 mechanical anti-erosion measures implemented. Degree of target achievement: 81 to 183%.** These 117 anti-erosion measures included: *lavaka* biological and mechanical stabilization (81), river banks stabilization (14), canals and drains reinforcement (19), and sand deposits stabilization (3). They were financed entirely by the project. It is to be recalled that the original target value from PAD was 145. We

therefore have an 81 percent achievement rate against original target from PAD and a 183 percent achievement rate against revised target.

49. **Intermediate results indicator 13: 80% reforestation success rate. Degree of target achievement: 99%.** This is the value achieved at the end of the project. However, in most afforestation and pasture improvement sites, the project came to an end without having clarified the responsibilities for the maintenance and future exploitation of the newly vegetated areas. For example, about 1,000 ha were afforested in the Sahamaloto watershed on lands belonging to the State, under an agreement between the Regional Environment Directorate and the IWMP. The works were carried out by a myriad of GGDTs that were also in charge of maintaining the plantations during their first year. Most GGDTs were probably mostly constituted of poor people looking for an immediate income (the sub-projects were entirely financed by the project) and not interested in longer-term benefits. .

50. **Intermediate results indicator 14: 5 operational guichets fonciers. Degree of target achievement: 100%.** This value needs however to be qualified. First of all, it must be noted that the Law 2005-019 creating the *guichets fonciers* in September 2005 had only given them the responsibility for managing traditional (non-titled) land. Consequently, the *guichets fonciers* could not intervene on irrigated areas, most of which are already titled. The SPs played an important role in identifying the water users on the various perimeters and delineate their plots but this activity, having no legal background, cannot be assimilated to land securisation. Second, to become operational, a *guichet foncier* needs to have a *Plan Local d'Occupation Foncière* (PLOF, communal land use plan). Considerable delays were incurred in the delivery of the aerial pictures needed and the recruitment of the operator in charge of establishing the PLOFs. Apart from the *guichet foncier* of Marovoay that effectively started operating in 2008 using older aerial pictures, because it was also supported by the *Programme de Lutte Anti-Erosive* (PLAE, Anti-Erosion Program), all the others *guichets fonciers* only got their respective PLOF in March 2014, seven years after the project start and just before a new regulation was issued in July 2014 that stipulated that land certificates could not be issued any longer in the absence of a *Schéma d'Aménagement Communal* (SAC, communal development plan). Most communes not having the financial and technical means to establish a SAC, the work of most *guichets fonciers* came to a halt before having started²⁹. It appears that some of the communes involved in the project are not maintaining their *guichet foncier* any longer, meaning that the investment in terms of capacity building may be partially lost. The land tenure security activities under the IWMP obviously suffered from inadequate attention from project management and supervision, to be related to the fact that they were a very minor (in size of funding) sub-component of the project.

29 In reality, the new regulation of July 2014 specifies that the *guichets fonciers* can continue delivering land certificates for areas below 5 ha but apparently most *guichets fonciers* were not aware of that exception and discontinued their activity.

Appendix 1: Total area, area with reliable water control at the end of the project and number of users of the irrigation schemes included in IWMP

Site/Region	Cluster	Perimeter	Area in PAD (ha)	Area as verified during IWMP (ha)			Number of users	
				Total	Rehabilitated	Reliable water control		
ITASY		Analavory		140	140	127	258	
		Antanimenakely		75	75	65	164	
		Mangabe		270	215	145	451	
		Ifanja Sud	Ambatomenarana		258	258	85	332
			Anosibe Ifanja		151	151	33	510
			Voaramaina		218	218	26	380
			Ambohimandroso		305	305	141	420
			Ambatolampy		161	161	0	325
			S/Total Ifanja Sud		1,093	1,093	285	1,967
			Ifanja Nord¹					
		Lac Itasy - Antanetibe	Ambohimanana ¹					
			Tongolo		281	281	161	nd
			Antanetibe		270	247	218	340
			Andakana		122	122	102	160
			Ambohimizana		214	214	141	290
			Anosimidona		80	80	60	300
			Anatroa		66	66	65	105
			S/Total Lac Itasy - Antanetibe		1,033	1,010	747	1,195
		Fitandambo ²	Ambohimarina		274	274	197	250
			Morarano		55	55	37	107
			Kelimahery					
			Ambondrona		21	21	21	72
			Ambohibary		87	87	59	140
			Andranofotsy		221	221	218	250
			Ambodivona		111	111	18	140
			Mitsinjo		87	87	70	306
			Ambohimanana		356	356	220	378
	Morafeno			57	57	51	100	
	Mahatsinjo			197	197	197	260	
	Amboanikaso			231	231	135	310	
	Fiantsonana			300	300	150	280	
	S/Total Fitandambo			1,997	1,997	1,373	2,593	
	S/total ITASY			5,660	4,608	2,742	6,628	

Appendix 1: Total area, area with reliable water control at the end of the project and number of users of the irrigation schemes included in IWMP (continued)

Site/Region	Cluster	Perimeter	Area in PAD (ha)	Area as verified during IWMP (ha)			Number of users
				Total	Rehabilitated	Reliable water control	
ANDAPA/SAVA	Ambalamanasy II	Antanimbaribe ¹					
		Bedinta		140	140	135	161
		Andasibe Kobahina		74	74	65	110
		Antsahameloka		109	109	103	148
		S/Total Ambalamanasy II		323	323	303	419
	Bealampona	Ambodipont ²					
		Analanambe ³					
		Andasibe Mahaverika		450	450	340	481
	Ankaibe	Beantsaladina zone IA		238	238	170	592
		Beanjavidy zone IV		272	272	149	864
		Ankaibe zone IB		587	587	321	1,235
		Ankaibe zone II		592	592	334	1,448
		Ankaibe zone III		411	411	225	990
		S/Total Ankaibe		2,100	2,100	1,199	5,129
		S/total ANDAPA	3,650	2,873	2,873	1,842	6,029
MAROVOAY /BOENY		Secteur 4		2,170	2,170	1,690	1,894
		Secteur 5		1,748	1,748	1,521	1,465
		Secteur 10		1,450	1,450	1,075	651
		Secteur 11 ¹					
		Secteur 13 ¹					
		S/total MAROVOAY	6,070	5,368	5,368	4,286	4,010
ALAOTRA		Sahamaloto	6,400	7,202	7,202	5,159	6,123
	TOTAL		21,780	20,051	19,972	14,029	22,790

Note: ¹ Perimeters initially included in the PAD but eventually not in IWMP on cost or users' insufficient motivation grounds;

² Perimeters initially not included in the PAD but eventually included in IWMP because of the motivation demonstrated by their users;

³ Perimeters included in the PAD and in IWMP for which eventually, only some limited support to the WUAs was extended, and a limited number of Component A and Component C sub-projects established (no PC, no study, no rehabilitation works).

Source: CelCo.

Appendix 2: Degree of completion of irrigation scheme rehabilitation works planned under IWMP

Site/Region	Cluster/Perimeter	Studies	Total works planned million Ar	Total works executed million Ar	% executed	Remarks	Will remaining works be taken over by PURSAPS ?
ITASY	Analavory	Completed	167.1	167.1 ¹	100%		-
	Antanimenakely	Completed	97.9	97.9 ¹	100%		-
	Mangabe	Completed	697.4	55.9 ¹	8%		No
	Ifanja Sud	Completed	6,430.6	432.2	7%	The WUA of Ambatolampy does not have a PC.	Yes, partly Remaining works were estimated at about Ar 6 billion in 2012/13, i.e. about US\$ 2.7 million. PURSAPS works are projected to cost about US\$ 1.2 million (1,175 ha at US\$ 1,000/ha), i.e. less than half what had been planned.
	Antanetibe cluster, incl. works on river	Completed	5,959.2	333.1	6%	The six WUAs do not have a PC.	No
	Fitandambo cluster	Completed	9,834.1	731.1	7%	Four WUAs do not have a PC.	No
	Total ITASY		23,186.3	1,817.3	8%		
ANDAPA/SAVA (Ankaibe excl.)	Ambalamanasy II cluster	Completed	644.6	644.6	100%		-
	Bealampona	Not all completed	476.7	476.7	100%	The WUAs of Ambodipont and Analanambe do not have a PC and studies were not carried out. The cost of the rehabilitation works on these two perimeters is thus not known yet.	Yes PURSAPS plans to finance rehabilitation works on Ambodipont and Analanambe schemes. Cost not known yet.
	Total ANDAPA (Ankaibe excluded)		1,121.3	1,121.3	100%		
MAROVOAY/BOENY	Sector 4	Not all completed	789.8	789.8	100%	The works completed in 2013/14 in the sectors 4 and 5 essentially concerned infrastructures included in the two WUA federations' PCs (works on primary canals). Most of the works planned for in the 23 WUAs' PCs have not been subject to studies and their cost is thus unknown.	No
	Sector 5	Not all completed	534.9	534.9	100%		No
	Sector 10	Completed	2,808.8	576.7	21%		Yes, partly Remaining works were estimated at about Ar 2.2 billion in 2012/13, i.e. about US\$ 1.0 million. PURSAPS works are projected to cost about US\$ 0.3 million, i.e. less than a third of what had been planned.
	Total MAROVOAY		4,133.5	1,901.4	46%		

Appendix 2: Degree of completion of irrigation scheme rehabilitation works planned under IWMP (continued)

Site/Region	Cluster/Perimeter	Studies	Total works planned million Ar	Total works executed million Ar	% executed	Remarks	Will remaining works be taken over by PURSAPS ?
ALAOTRA	Sahamaloto	Completed	29,377.0	2,210.8 ²	8%		Yes, partly Remaining works were estimated at about Ar 27.2 billion in 2013/14, i.e. about US\$ 11.8 million, of which Ar 4.4 billion priority works (about US\$ 1.9 million). PURSAPS plans to finance about half of these priority works (Ar 2.3 billion).
	Total ALAOTRA		29,377.0	2,210.8	8%		
	TOTAL IWMP (Ankaibe excl.)		57,818.1	7,050.8	12%		
ANDAPA/SAVA (Ankaibe)	Ankaibe		15,518.7	15,130.4 ³	97%		Yes Works for a total of Ar 312 million were financed on GoM resources in 2014. PURSAPS works in 2015 are projected to cost about Ar 1.1 billion (US\$ 0.4 million: 350 ha at US\$ 1,250/ha).

Note: ¹ Works were financed by the EU funded PARECAM during the IWMP disbursement freeze period.

² Excluding works on Anony perimeter (Ar 377.7 million) and including works financed by the EU funded PARECAM during the IWMP disbursement freeze period (Ar 149.4 million).

³ Including Ar 111.3 million funded on GoM resources in 2013.

Source: CelCo, PURSAPS.

Annex 3. Economic and Financial Analysis

Project costs

1. The project consumed 96 percent of IDA resources and 89 percent of GEF resources. Beneficiaries' contribution was estimated at Ar 4.2 billion³⁰ (about US\$ 2 million), i.e. 45 percent of their originally planned contribution. This is due to the fact that the project did not eventually finance sub-projects at downstream value chain level (storage, processing, marketing), for which it was originally planned that beneficiaries would contribute over US\$ 1 million, and that the project financed at 100 percent a number of non-transferable infrastructures that were not included in the initial project design, amongst which the Ankaibe weir and feeder canal.

2. The distribution of actual spending across components was slightly different from that originally planned (table 3.1). Principally due to three time extended project duration, Component D (Project Management), with 28 percent of total project costs, exceeded its originally planned share, mainly at the expense of Component A (Development of Commercial Agriculture) and Component B (Irrigation Development).

Table 3.1 : Distribution of planned and actual project spending across components (including beneficiaries' contribution)

Components	Planned at 2 nd restructuring (2012)	Final
E. Development of Commercial Agriculture	26%	22%
F. Irrigation Development	36%	32%
• <i>Ankaibe excluded</i>		11%
• <i>Ankaibe</i>		21%
G. Watershed Development	19%	19%
H. Project Management	19%	28%
Total	100%	100%

Source: Authors' calculations from World Bank 2012, CelCo, MINAGRI 2014.

3. The distribution of actual spending within Component B (irrigation) also differed greatly from what was planned at appraisal. Various delays in studies, beneficiaries' contribution mobilization (especially before the introduction of the MAPER in 2011, see section 2.2), tenders and works resulted in only a minor proportion of the works planned in the PCs and the corresponding studies to be implemented (table 3.2, see details in Annex 2 Appendix 2). Levels of realizations were even less if compared with what was planned in the WMPs (in Sahamaloto for example, the WMP had advised works be carried out to increase the capacity of the dam that has been halved due to sedimentation, which was not done). In all perimeters where the works planned in the PCs have not been implemented, the WUAs are

³⁰ Broken down as follows: Ar 3.4 billion as contribution to intensification sub-projects in Component A (Development of Commercial Agriculture); Ar 0.7 billion as contribution to rehabilitation works in Component B (Irrigation Development); and Ar 0.2 billion as contribution to SLM sub-projects in Component C (Watershed Development). Source: MINAGRI 2014.

thus in theory entitled to ask the authorities to comply with their commitment as per contractual agreement.

Table 3. 2 : Infrastructure rehabilitation in Component B (Irrigation): level of financial realization compared to projections in detailed design studies

Site	Level of financial realization of works planned in studies	Comments
Itasy	8%	
Marovoay (Boeny)	46%	However, it must be kept in mind that the works completed in 2013/14 in the sectors 4 and 5 essentially concerned infrastructures included in the two WUA federations' PCs (works on primary canals). Most of the works planned for in the 23 WUAs' PCs have not been subject to studies and their cost is thus unknown. The level of realization is thus much less than 46% if measured against the expectations the project has raised amongst water users.
Sahamaloto (Lac Alaotra)	8%	
Andapa (Sava), Ankaibe excluded	100%	The WUAs of Ambodipont and Analanambe do not have a PC and studies were not carried out. The cost of the rehabilitation works on these two perimeters is thus not known yet.
Total project, Ankaibe excluded	12%	

Source: MINAGRI 2014, CelCo (see details in Annex 2 Appendix 2).

4. As a result, while it was planned that the works on the Sahamaloto perimeter would represent two-thirds of total rehabilitation investments with a cost per hectare of about US\$ 1,600 (table 3.3), the rehabilitation works on all the project perimeters, Ankaibe excluded, only accounted for one-third of rehabilitation investments. The works on the Ankaibe weir and feeder canal that were not originally included in the project made up for the remaining two-thirds of the project actual spending on infrastructure rehabilitation, allowing the financial envelope for irrigation rehabilitation to be used up at the very end of the project (figure 3.1). Consequently, the average cost per hectare was much lower than that initially planned at US\$ 175³¹ (Ankaibe excluded). This may have had important consequences in terms of degree of water control and investment durability that were not evaluated.

³¹ Or about US\$ 400/ha if only areas with reliable water control are taken into account. By way of comparison, irrigation infrastructure rehabilitation projects currently funded by the African Development Bank in Madagascar have a cost per hectare of US\$ 2,000 to US\$ 3,000 and favor concrete coated primary canals on durability grounds.

Table 3.3 : Planned and actual irrigation rehabilitation costs

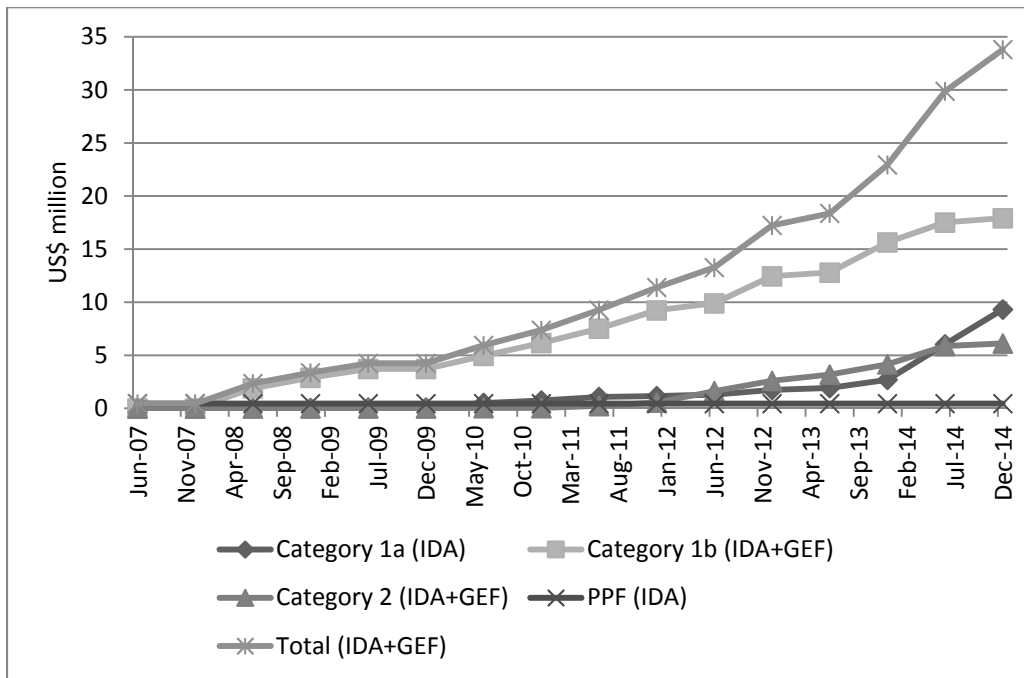
Perimeter/Region	PAD				Actual			
	Area (ha)	Rehabilitation cost ¹ (US\$ million)	Share of total cost (%)	Cost per ha (US\$/ha)	Area (ha)	Rehabilitation cost ¹ (US\$ million)	Share of total cost (%)	Cost per ha (US\$/ha)
Itasy	5,660	1.76	11%	311	4,178 ²	0.82	9%	196
Marovoay (Boeny)	6,070	2.97	19%	489	5,368	0.77	8%	143
Sahamaloto (Lac Alaotra)	6,400	10.29	67%	1.608	7,202	0.99	11%	137
Andapa (Sava), Ankaibe excl.	3,650	0.32	2%	88	773	0.48	5%	623
Total, Ankaibe excluded	21,780	15.33	100%	704	17,521	3.06	33%	175
Ankaibe (Sava)	-	-	-	-	2,100	6.19	67%	2,946
Total, Ankaibe included	-	-	-	-	19,621	9.25	100%	471

Note: ¹ Rehabilitation costs exclude studies and supervision.

² Total irrigated area participating in the project in Itasy was 4,608 ha, but 3 perimeters (Analavory, Antanimenakely and Mangabe) representing 430 ha were rehabilitated by the EU funded PARECAM project during the IWMP disbursement freeze period. They are therefore excluded for the calculation of the rehabilitation cost per hectare.

Source: CelCo, MINAGRI 2014.

Figure 3.1 : Disbursements by category of expenditure



Note: Category 1a: Irrigation scheme rehabilitation works, including supervision;
 Category 1b: Goods, works (other than for irrigation scheme rehabilitation), consultants' services, training and operating costs;
 Category 2: Sub-project matching grants.

Source: CelCo.

Financial analysis at beneficiary level

5. Although they were all labeled SRA or SRI, there was a wide variation in the packages tested by the various groups of participants in rice cultivation intensification sub-projects. For

example, SRA could mean NPK/urea combinations, expressed in kg/ha, as different as 150/50, 100/50, 0/75, 0/25, etc. This wide variation, however, did not correspond to a deliberate intention of the project to test and identify different packages adapted to different conditions (in particular, no soil analysis was carried out) or farmers' economic conditions, but rather reflects the wishes expressed by farmers' groups, probably based mainly on their assessment of their contribution capacity. The actual yields obtained with these various combinations were not monitored.

6. Despite being repeatedly emphasized by the supervision missions³² as a critical issue that ought to deserve more in-depth analysis, the feasibility (especially in terms of additional labor and financing requirements) and profitability of the technology packages that were promoted by the project were apparently never given much attention by the project M&E unit. Most of the financial analyses that were carried out in the irrigated rice intensification sub-project applications displayed a Value-Cost Ratio (VCR) around 2 or below. This is confirmed by calculations based on two "standard" SRI and SRA models (table 3.4) using quite optimistic yields (6.3 tons/ha for SRA and 8.0 tons/ha for SRI) and post-harvest loss allowance (10 percent only) and not taking into account equipment amortization, for which VCRs of 1.9 were obtained. A widely held convention is that in "normal" risks situations, a VCR greater than 2 is necessary to provide sufficient incentives for naturally risk-adverse farmers to adopt fertilizer and in especially risky production environments, a minimum VCR of 3 to 4 may be needed³³. While profitable in theory, the packages promoted by the project, in their entirety, were thus likely to be little attractive to farmers in general, and even more so in the areas affected by poor water control.

7. This, combined with possible labor shortage and lack of access to credit, certainly accounts for the very high drop-out rates observed between sub-project cycles, as the element of subsidy decreased³⁴, and for the widespread observation that follower farmers around sub-projects generally adopted only the "soft" elements of the packages (such as earlier and in-row transplanting, etc.) and not the fertilizer element.

8. More in-depth work will have to be carried out on this issue, differentiating between farmers' agro-ecological and economic conditions, if similar projects are to be prepared in the future.

³² Especially in October 2010, at MTR in September-October 2011 and in October 2012.

³³ Morris et al., 2007, p.46.

³⁴ Intensification sub-projects (rice intensification in irrigated schemes and under-cover cultivation on *tanety*) were to be implemented over a 3 year cycle, with a project subsidy decreasing from 80 percent in Year 1 to 50 percent in Year 2 and 20 percent in Year 3,. The dropping-out rate proved to be extremely high at 32 percent between Year 1 and Year 2 and 86 percent between Year 2 and Year 3 for subprojects in irrigated schemes, where only about 10 percent of all sub-projects financed completed the 3 year cycle.

Table 3. 4 : Cost-benefit analysis of SRA and SRI packages

	Unit	Unit price Ar '000	Without project		SRA		SRI	
			Quantity	Ar '000	Quantity	Ar '000	Quantity	Ar '000
Improved seed	kg	2.0	-	-	20	40.0	8	16.0
Organic manure	ton	50.0	-	-	5	250.0	10	500.0
Guanomad ¹	kg	1.0	-	-	300	300.0	300	300.0
NPK	kg	2.3	-	-	100	230.0	200	460.0
Urea	kg	2.3	-	-	50	115.0	75	172.5
Labor	p.-day	3.0	130	390.0	180	540.0	210	630.0
Incremental cost²			-	-		1,085.0		1,688.5
Paddy production	ton	700	2.7	1,890.0	6.3 ³	4,410.0	8.0 ⁴	5,600.0
Incremental benefit			-	-		2,079.0⁵		3,150.0⁵
VCR			-	-		1.9		1.9

Note: ¹ Guanomad is an organic fertilizer produced in Madagascar using bat dejections.

² Equipment amortization not taken into account.

³ Average yield reported by the project on sub-projects in Itasy and Sava, where SRA was predominantly promoted.

⁴ The average yield reported by the project on sub-projects in Sahamaloto, where SRI was predominantly promoted, was 6.8 tons/ha; however, the Ministry of Agriculture's SRI reference yield of 8,0 tons/ha was used.

⁵ A very optimistic 10 percent allowance for post-harvest losses was applied to SRA and SRI yields that were obtained from measures on still standing crops.

Source: Authors' calculations.

9. Drop-out rates were even worse for intensification sub-projects on uplands (mostly under vegetative cover cultivation)³⁵, reflecting here again the lack of attractiveness of the proposed packages to farmers in the absence of a subsidy element. Here again, no analysis was carried out by the project M&E unit and more in-depth work would have to be carried out in order to identify viable technology packages for future similar projects.

³⁵ 82 percent of under-cover cultivation sub-projects did not make it to Year 2 and no sub-project at all reached Year 3.

Economic analysis

Methodology

10. Economic rates of return (ERR) and Net Present Values (NPV) were computed for each region, as was done at appraisal, using a slightly different methodology to account for the variations between the plans that were made at appraisal and actual implementation. In particular, while at appraisal benefits arising from investments on the uplands and reduced siltation were taken into account, only the incremental paddy production in irrigated areas was considered here, in view of the limited results achieved on the uplands. Similarly, no benefits from diversification were included since diversification activities were discontinued early in the project life.

11. Consequently, only the costs directly related to investments in the irrigated areas were taken into account in this ICR's economic analysis. All costs related to the establishment of rice intensification sub-projects under Component A and irrigation rehabilitation under Component B were included. Costs of Component C were excluded. Logically, only two-thirds of project management and TA costs were included.

12. More specifically, as regards irrigation rehabilitation, the costs of the studies that were not followed by corresponding works under IWMP were excluded (table 3.5). By contrast, the costs of the works financed by the EU funded PARECAM project in Itasy and Lac Alaotra during the period of IWMP disbursement freeze were included (table 3.6), since the studies for these works had been financed by IWMP and these works directly contributed to the project results. Similarly, for Ankaibe perimeter, the costs of the works that were financed by GoM on internal resources in 2013 and 2014 and the costs of the works planned to be implemented by PURSAPS in 2015-2016 were included, since they are necessary to achieve reliable water control on the entirety of that perimeter, which is a condition for attaining the average yields that were assumed for that perimeter in the future. Finally, the cost of the emergency works carried out in 2008 on the dyke of the Anony perimeter in Lac Alaotra region (Ar 377.7 million) was excluded since their related benefits were not valued.

Table 3.5 : Detailed studies the cost of which was excluded from the economic analysis

Region	Cluster/Perimeter	Consultant firm	Year	Cost (Ar million)
Itasy	Mangabe-Antanetibe	Artelia	2013-2014	149.9
	Ifanja Sud	EEDR Mamokatra	2012-2013	113.4
Sava	Analanambe	Jery	2011	3.4
Boeny	Marovoay Sector 10	Boaneri	2012-2013	33.4
Lac Alaotra	Sahamaloto	Hari	2013-2014	124.1
Total				424.2

Note: Cost VAT included. As a comparison, the cost of the studies (design and supervision) included in the economic analysis was as follows (Ar million): Itasy: 442.2; Sava (Ankaibe excluded): 64.7; Boeny: 309.3; Lac Alaotra: 309.8; Total (Ankaibe excluded): 1,125.9; Ankaibe: 1,004.5.

Source: Celco.

Table 3. 6 : Works not financed by IWMP but the cost of which was included in the economic analysis

Region	Cluster/Perimeter	Source of funding	Year	Cost (Ar million)
Itasy	Analavory	PARECAM	2009-2010	167.1
	Antanimenakely	PARECAM	2009-2010	97.1
	Mangabe	PARECAM	2009-2010	55.9
Lac Alaotra	Sahamaloto	PARECAM	2009-2010	149.4
Sava	Ankaibe	GoM	2013	111.3
		GoM	2014	312.0
		PURSAPS	2015-2016	1,100.0
Total				1,992.8

Note: Cost VAT included. As a comparison, the total cost of the works included in the economic analysis, including those in the above table, was as follows (Ar million): Itasy: 1,869.6; Sava (Ankaibe excluded): 1,121.3; Boeny: 1,843.1; Lac Alaotra: 2,210.8; Total (Ankaibe excluded): 7,044.8; Ankaibe: 15,130.4.

Source: Celco.

13. All project costs were converted into economic costs removing VAT when applicable, and expressed in 2014 terms using the GDP deflator annual growth rate given by <http://data.worldbank.org/> (March 2015).

14. Regarding farmers' incremental costs, the SRI and SRA budgets presented earlier in the financial analysis section were used and a third budget was established to reflect the incremental costs incurred by follower farmers, based on the assumption, confirmed by field observations, that the vast majority of follower farmers adopted only partially the new technology packages (table 3.7).

Table 3. 7 : Incremental costs incurred by participating farmers, and conversion in economic terms

	Unit	SRA	SRI	Follower farmer	Financial unit price (Ar)	Economic unit price (Ar)
		Quantity	Quantity	Quantity		
Improved seed	kg	20	8	20	2,000	1,667 ¹
Organic manure	ton	5	10	-	50,000	50,000
Guanomad	kg	300	300	300	1,000	833 ¹
NPK	kg	100	200	-	2,300	1,917 ¹
Urea	kg	50	75	50	2,300	1,917 ¹
Labor	p.-day	50	80	50	3,000	3,000 ²

Note: ¹ VAT 20% excluded.

² The opportunity cost of labor was valued at market price since there is a labor shortage at peak cropping periods (transplanting, weeding and harvest).

Source: Authors' observations.

15. As regards paddy yields, two scenarios were considered (table 3.8):

- (i) a scenario using the yields announced by the project; to calculate the overall incremental cost of inputs used, it was assumed that these average yields were the result of 20 percent of the farmers practicing the new technology package (SRA in Itasy and Sava, SRI in Lac Alaotra) and 60 percent of farmers having adopted the

follower simplified package (with 20 percent of the farmers not having adopted any new technology); in Marovoay, where the reported average yield is much lower, it was assumed that the follower package was being applied on half the scheme area, with the other half not having adopted any new technology;

- (ii) a less optimistic but maybe closer to reality (and more consistent with the anecdotal evidence gathered during field visits) scenario whereby the average yields that the project claims to have achieved were applied to 30 percent of the schemes area whereas it was assumed that the remaining 70 percent of the schemes still apply traditional technologies and thus have unchanged yields; under this scenario, average yields at the end of the project would be 3.4 tons/ha on the schemes in the Itasy region, 4 tons/ha on the Sahamaloto perimeter and 3.3 tons/ha on the schemes in the Sava region, Ankaibe excluded; to calculate the overall incremental cost of inputs used, it was assumed that these average yields were the result of 30 percent of the farmers applying the follower package, the remaining 70 percent not having changed technology levels.

Table 3. 8: With and without project average paddy yields (mt/ha)

	Itasy	Sava (Ankaibe excl.)	Sava (Ankaibe)	Boeny	Lac Alaotra	Project
Without project (baseline)	2.8	2.5	-	2.1	3.5	2.7
With project - scenario 1 (project reported results 2013/14)	4.9	5.0	5.0	2.6	5.2	4.4
With project - scenario 2 (project reported yields applied to 30% area, rest unchanged)	3.4	3.3	3.3	2.6	4.0	3.4

Source: World Bank 2012 (baseline), MINAGRI 2014 (scenario 1) and authors' calculations (scenario 2).

16. For Marovoay, the average yield announced by the project (2.6 tons/ha) was used in both scenarios and applied to 100 percent of the area as it seems realistic and was confirmed during discussions with beneficiaries.

17. For Ankaibe, it was assumed that yields similar to those on other Sava region IWMP rehabilitated schemes (5.0 tons/ha under scenario 1 and 3.3 tons/ha under scenario 2) would be obtained on 100 percent of the area after the completion of the rehabilitation works by PURSAPS in 2016.

18. The following cropping intensities were used: Itasy: 140 percent; Sava: 200 percent; and Boeny and Lac Alaotra: 100 percent.

19. Paddy economic price was valued at 2014 average market price (Ar 700/kg)³⁶. Rice import parity price was not used as the 10-20 percent premium that is currently paid for local rice over imported rice price is said to reflect a preference for locally produced rice.

20. Additional benefits arising from possible technology adoption beyond participating irrigation schemes were not taken into account.

³⁶ Source: *Observatoire du Riz* (paddy and rice price observatory at Prime Minister's Office level).

21. Whereas at appraisal, NPVs and ERRs were computed assuming a 20 year project life cycle, a 10 year lifespan for project investments was used here, to reflect the much lower intensity of the rehabilitation works that were actually carried out.

22. Finally, as at appraisal, 10 percent was regarded as the opportunity cost of capital in Madagascar.

Results

23. Results are presented in table 3.9 below.

Table 3.9 : Economic analysis results

Perimeter/Region	PAD		Scenario 1: average yields announced by the project applied to 100% area		Scenario 2: average yields announced by the project applied to 30% area ¹	
	ERR	NPV 10% (2006 US\$ million)	ERR	NPV 10% (2014 US\$ million)	ERR	NPV 10% (2014 US\$ million)
Itasy	20%	6.6	73%	8.3	19%	1.1
Marovoay (Boeny)	13%	1.6	-12%	-1.8	-12%	-1.8
Sahamaloto (Lac Alaotra)	8%	-1.4	37%	3.7	9%	-0.1
Andapa (Sava), Ankaibe excl.	13%	1.6	36%	1.9	5%	-0.4
Overall project, Ankaibe excl.	14%	9.4	36%	12.1	7%	-1.1
Ankaibe (Sava)	-	-	32%	7.4	27%	5.2
Overall project	14%	9.4	35%	19.5	15%	4.1

Note: ¹ Except for Marovoay and Ankaibe, see text.

Source: Authors' calculations.

24. As was foreseen at appraisal, Itasy shows a greater ERR than the other regions, Ankaibe excluded, and an ERR that is still well above the opportunity cost of capital under scenario 2, due to a combination of factors: higher cropping intensity (estimated at 140 percent while it is only 100 percent in Marovoay and Sahamaloto), relatively high yield gains and contained rehabilitation costs. Despite having the highest cropping intensity (200 percent) and yield gains, the Sava region (Ankaibe excluded) has a lower ERR, only 5 percent under scenario 2, due to higher rehabilitation costs per hectare. Returns are negative in Marovoay with the limited yield gains observed. The ERR for Sahamaloto is very close to the 10 percent threshold even under scenario 2.

25. It is interesting to note that though it was not planned at appraisal, the Ankaibe weir and feeder canal construction boasts a high ERR, due to a series of factors: (i) the Ankaibe perimeter was not used any longer, thus the foreseen yields are 100 percent project benefits; (ii) it is assumed that rehabilitation works will be finalized by PURSAPS and support extended to farmers so that they get similar yields to those obtained on other IWMP rehabilitated Sava schemes; and (iii) a cropping intensity of 200 percent is expected as in most irrigated areas in the Sava region. Under scenario 2, the Ankaibe part of the project has the highest ERR and enables the project as a whole to display an ERR of 15 percent, just higher than the overall project ERR that had been calculated at appraisal. Therefore, not only has the Ankaibe weir and feeder canal construction allowed the project to use up its rehabilitation works credits and to gain considerable visibility, but it has also highly contributed to its overall economic profitability.

Sensitivity analysis

26. Every effort to increase the area under improved technology over the 30 percent level assumed in scenario 2 would obviously lead to greater ERRs. Indeed, the ERR proves to be extremely sensitive to an increase in the area under improved technology (or in other words, an increase in the average yield observed in the scheme). An increase from 30 to 35 percent in the proportion of the area under improved technology in Sahamaloto, equivalent to an increase in the average yield on the perimeter from 4.0 to 4.1 tons/ha, would improve Sahamaloto's ERR to 13 percent. Similarly, an increase from 30 to 40 percent in the proportion of the area under improved technology in Sava perimeters (Ankaibe excluded), equivalent to an increase in the average yield on the scheme from 3.3 to 3.5 tons/ha, would improve the ERR to 10 percent. This calls for continued efforts to promote improved technologies packages adapted to farmers' capacities in the irrigated schemes that were rehabilitated by the project.

27. The Ankaibe ERR proves to be very robust against lower than expected yields: even if the average yield on the Ankaibe scheme were not to exceed the baseline yield of 2.5 tons/ha that was observed in the Sava region at the onset of the project, the Ankaibe ERR would still be high at 21 percent, and the overall project ERR under scenario 2 over the opportunity cost of capital at 12 percent.

28. Due to the low intensity of the works that were carried out and the difficulties WUAs are facing to collect adequate amounts of O&M fees, there is a major risk that the life of most project rehabilitation investments be less than the 10 year period used in the above analysis in all sites except Ankaibe, where works can, on the contrary, be expected to last longer than 10 years. An analysis was therefore carried out for all sites but Ankaibe assuming an investment lifespan of 5 years. Project returns are quite robust against that shortened investment life under scenario 1 but would become largely negative, except in Itasy, under scenario 2 (table 3.10).

Table 3. 10 : Economic analysis results with a 5 year investment life

Perimeter/Region	Scenario 1: average yields announced by the project applied to 100% area		Scenario 2: average yields announced by the project applied to 30% area ¹	
	ERR	NPV 10% (2014 US\$ million)	ERR	NPV 10% (2014 US\$ million)
Itasy	72%	6.0	14%	0.3
Marovoay (Boeny)	-27%	-1.9	-27%	-1.9
Sahamaloto (Lac Alaotra)	35%	2.2	1%	-0.8
Andapa (Sava), Ankaibe excl.	33%	1.2	-4%	-0.6
Overall project, Ankaibe excl.	34%	7.4	-1%	-3.0

Note: ¹ Except for Marovoay and Ankaibe, see text.

Source: Authors' calculations.

29. Applying a 20 year lifespan for the Ankaibe investment, even assuming a US\$ 3.2 million rehabilitation of the scheme every 10 years (US\$ 1,500/ha), naturally gives very good ERRs: 33 percent under scenario 1 (NPV: 2014 US\$ 11.8 million) and 29 percent under scenario 2 (NPV: 2014 US\$ 8.6 million).

Annex 4. Bank Lending and Implementation Support/Supervision Processes

(a) Task Team members

Names	Title	Unit	TTL Responsibility (year and location)
Lending			
Ziva Razafintsalama	Sr. Rural Development, TTL	AFTAR	
Sofia Bettencourt	Lead Operations Officer	AFTEN	
Mohamed Arbi Ben-Achour	Sr. Social Scientist	AFTCS	
Soulemane Fofana	Operations Officer	AFTAR	
Suzanne Morris	Sr. Finance Officer	LOAFC	
Gervais Rakotoarimanana	Sr. Financial Management Spec.	AFTFM	
Sylvain Rambelison	Sr. Procurement Specialist	AFTPC	
Lova Niaina Ravaorimino	Procurement Analyst	AFTPC	
Paul Jean Feno	Environmental Specialist	AFTEN	
Eavan O'Halloran	Sr. Country Officer	AFMMG	
Christophe Crepin	Lead Environment Specialist	AFTEN	
Gilles Veillot	Sr. Counsel	LEGAF	
Erika Styger	Consultant	AFTEN	
Robert Robelus	Consultant	AFTAR	
Patrick Labaste	Lead Agriculture Economist	AFTAR	
Jean-Christophe Carret	Sr. Environmental Specialist	AFTEN	
Juerg Brand	Consultant	AFTEN	
Francois Onimus	Sr. Irrigation Specialist	AFTWR	
Rondro M. Rajaobelison	Program Assistant	AFMMG	
Marie-Claudine Fundi	Language Program Assistant	AFTAR	
Cynthia Faure	Team Assistant	AFMMG	
Ijsbrand de Jong	Sr. Water Resources Spec., TTL	AFTS2	
Wolfgang Chadab	Finance Officer	LOAG2	
Jean Paul Chausse	Lead Operations Officer	AFTS1	
Frits Ohler	Watershed Specialist	FAO	
Hermann Pfeiffer	Agricultural Extension Spec.		
Franco Russo	Sr. Program Assistant	AFTS1	
Caroline Guazzo	Program Assistant	AFTS1	
Supervision/ICR			
Ziva Razafintsalama	Sr. Rural Development, TTL	AFTAR	
Achim Fock	Sr. Economist	AFTAR	
Michael Morris	Lead Agriculture Economist	AFTAR	
Jan Joost Nijhoff	Sr. Agriculture Economist	AFTAR	
Francois Onimus	Sr. Water Resources Specialist	AFTWR	

Steven Schonberger	Lead Operations Officer	AFTAR	
Sossena Tassew	Operations Analyst	AFTAR	
Volana Andriamasinoro	Program Assistant	AFMMG	
Severin Kodderitzsch	Sector Manager	AFTA2	
Patrice Rakotoniaina	Sr. Municipal Engineer	AFTU2	
Paul Jean Feno	Sr. Environmental Specialist	AFTEN	
Martien van Nieuwkoop	Sector Manager	AFTA1	
Soulemane Fofana	Operations Officer	AFTAR	
Pierrick Fraval	Sr. Water Resources Specialist	AFTWR	
Lova Ravaoarimino	Sr. Procurement Specialist	AFTPC	
Joseph Byamugisha	Financial Management Specialist	AFTFM	
Pieter Waalewijn	Sr. Water Resources Specialist	AFTWR	
Diego Garrido Martin	Monitoring & Evaluation Spec.	AFTOS	
Marie-Claudine Fundi	Language Program Assistant	AFTAR	
Nora Kaoues	Sr. Operation Officer	AFTAR	
Frits Ohler	Watershed Specialist	FAO	

(b) Staff Time and Cost

Stage of Project Cycle	Staff Time and Cost (Bank Budget Only)	
	No. of staff weeks	USD Thousands (including travel and consultant costs)
Lending		
FY05	50.94 (IDA)	229.78
	12.90 (GEF)	169.59
FY06	82.00 (IDA)	402.09
	0.70 (GEF)	32.81
FY07	16.01 (IDA)	42.27
	0.95 (GEF)	6.88
FY08	7.72 (GEF)	55.81
FY09	1.25 (GEF)	1.20
	Total IDA	156.67
	Total GEF	23.52
Supervision/ICR		
FY07	16.40 (IDA)	45.80
FY08	46.90 (IDA)	88.86
FY09	28.79 (IDA)	58.43
	9.20 (GEF)	20.87
FY10	27.92 (IDA)	37.63
	16.93 (GEF)	19.40
FY11	36.19 (IDA)	86.72
	31.07 (GEF)	37.44

FY12	36.45 (IDA)	155.93
	25.25 (GEF)	26.73
FY13	27.20 (IDA)	118.20
	27.54 (GEF)	42.46
FY14	17.84 (IDA)	61.99
	21.96 (GEF)	26.52
FY15	12.73 (IDA)	33.03
Total IDA	250.42	686.59
Total GEF	131.95	173.42

Annex 5. Beneficiary Survey Results

Projet Bassins Versants Périmètres Irrigués – Evaluation par les Bénéficiaires du Projet, Savaivo, Décembre 2014

Résumé

Le Projet Bassins Versants – Périmètres Irrigués (BVPI) mis en œuvre depuis 2007, sous financement IDA et GEF est arrivé à sa fin en décembre 2014. Le Projet a pour objectif d'augmenter de façon durable la production agricole dans quatre bassins versants à haut potentiel de développement et les périmètres irrigués associés que sont la zone d'Andapa dans la région de la SAVA, la zone de Marovoay dans la région de Boeny, la zone de d'Itasy dans la région d'Itasy ainsi que la zone du Lac Alaotra dans la région Alaotra Mangoro. Le système de suivi-évaluation du Projet a prévu une évaluation par les bénéficiaires pour recueillir leurs perceptions, leurs comportements et leurs visions vis-à-vis des prestations et des résultats dudit Projet. Les conclusions de cette évaluation permettront au ministère de tutelle, en l'occurrence le Ministère de l'Agriculture, d'améliorer la qualité des services rendus au profit des ménages ruraux dans le cadre de futurs projets similaires.

La présente étude essaie de déterminer la valeur des activités, des résultats et des impacts du Projet BVPI telle qu'elle est perçue par les bénéficiaires, pour les sous-projets des sous composantes A2 (intensification agricole dans les périmètres irrigués ou dans les sous-bassins versants) et C2 (investissement dans les bassins versants).

L'évaluation a porté sur 301 sous-projets correspondant à environ 8% de l'ensemble des sous-projets financés pour les deux composantes. Ces sous-projets couvrent les thèmes d'arboriculture fruitière, d'intensification agricole sur bassins versants (pour les cultures de haricot, d'arachide, de vanille), d'intensification agricole sur périmètres irrigués essentiellement de la riziculture pour la sous-composante A2 ; tandis que pour la sous-composante C2, ils consistent à la stabilisation des lavaka, la protection des berges, la mise en place des pépinières, à des reboisements ainsi qu'à l'amélioration des pâturages. Par ailleurs, 53 personnes ressources constituées par des responsables administratifs et des autorités locales, des responsables des services techniques déconcentrés (DRDR, CSA, DREF), des responsables des institutions de micro-finance, des partenaires stratégiques du Projet BVPI ainsi que des opérateurs économiques, ont été interviewées pour recueillir leurs avis et perceptions.

Les résultats de cette évaluation par les bénéficiaires et par les autres acteurs ayant contribué à l'opérationnalisation du Projet BVPI sont présentés ci-après.

Echelle d'évaluation

Très pertinent – pertinent – moyennement pertinent – faiblement pertinent

Très efficient – efficient – moyennement efficient – faiblement efficient

Très efficace – efficace – moyennement efficace – faiblement efficace

Impacts très élevés – impacts élevés – impacts moyens – impacts faibles

Viabilité très élevée – viabilité élevée – viabilité moyenne – viabilité faible

Satisfaction très élevée – satisfaction élevée – satisfaction moyenne – satisfaction faible

Pertinence du Projet

L'évaluation de la pertinence du Projet a été faite tout d'abord à travers la réponse du Projet aux besoins et aux contraintes des paysans, ensuite à partir de l'adéquation de l'approche et des techniques adoptées ; enfin à travers les services des partenaires ainsi qu'à l'adéquation des modalités de financement.

En général, le Projet BVPI a été jugé très pertinent étant donné que ses interventions à travers le financement des sous-projets ont apporté des réponses favorables aux attentes des paysans ainsi qu'à leurs contraintes de production selon les perceptions des organisations paysannes (OP) ayant reçu les appuis.

En moyenne, 82% des OP (81% pour la sous-composante A2 et 84% pour la sous-composante C2) ont constaté une contribution élevée de la part du Projet dans la résolution de ces contraintes que ce soit en termes d'appui technique, matériel ou financier ; que ce soit en termes de sensibilisation et/ou de formation ; que ce soit en termes de réhabilitation des infrastructures d'irrigation. Selon les personnes ressources interviewées, 94% jugent que la contribution du Projet BVPI est élevée.

L'approche en sous-bassin versant adoptée par le Projet a aussi été vue comme très adaptée à leurs conditions de vie quotidienne, conditions sociales et environnementales. L'approche est très adaptée aux conditions des paysans selon 82% des OP (79% pour A2 et 88% pour C2) et selon les 92% des personnes ressources. L'approche liant la protection des périmètres irrigués contre les ensablements avec celle des bassins versants, a été notée par les OP.

Sur les technologies apportées par le Projet par rapport aux besoins et contraintes de production des paysans, 85% des OP jugent qu'elles sont adéquates car faciles à réaliser, simples et efficaces (même pourcentage pour A2 et C2). Les techniques de SRI et de SRA ont beaucoup réduit les semences alors que le rendement a augmenté. Cette adéquation a été aussi jugée très bonne pour 73% des personnes ressources.

En matière de services fournis par les partenaires stratégiques, 91% des OP constatent une qualité élevée (même pourcentage pour A2 et C2). Les partenaires ont apporté leurs expériences de terrain en réalisant les formations théoriques et pratiques, et cela à travers une pédagogie adaptée au niveau des paysans. La disponibilité des partenaires pour accompagner les OP a été jugée élevée pour une moyenne de 79% (80% pour A2 et 77% pour C2). En effet malgré certains problèmes d'accessibilité, ils répondent toujours présents. Ainsi, suite à cette disponibilité ils ont été aussi jugés comme possédant une capacité d'intégration élevée dans le milieu, pour 90% des OP (90% pour A2 et 89% pour C2).

Sur les modalités de financement des sous-projets, elles ont été jugées moyennement adéquates pour 44% des OP (41% pour A2 et 49% pour C2) contre 33% des OP ayant jugé ces modalités comme très adéquates. Les appuis financiers ont permis l'acquisition des intrants et des matériels nécessaires. Toutefois, la modalité d'appui financier dégressif est jugée inappropriée étant donné que certains bénéficiaires n'ont pas pu honorer leurs apports lors du cycle 3, et les OP constatent généralement un retard du déblocage de fonds non adapté au cycle culturel. Par ailleurs la modalité de financement [BVPI : 80% et bénéficiaires : 20%] pour A2 a été jugée moyennement adaptée à très adéquate pour 92% des personnes ressources ; tandis que pour C2 la modalité [BVPI : 100%] a été jugée la plus adéquate pour 80% des personnes ressources.

Efficiences du Projet

L'efficience du Projet a été évaluée à partir de la participation et de l'implication des bénéficiaires tout au long de la mise en œuvre des sous-projets ; ensuite à partir du degré de transparence des dépenses liées à la réalisation des sous-projets ; et enfin à travers les capacités techniques, institutionnelles et organisationnelles des bénéficiaires. En général, le Projet est jugé comme efficient.

D'une manière générale, la participation et l'implication des bénéficiaires dans le processus de mise en œuvre des sous-projets ont été jugées élevées par 64% des personnes ressources interviewées. Mais selon les résultats des focus group, hormis les autres étapes, le niveau d'implication des bénéficiaires est faible dans l'identification ou le choix des sous-projets. Aussi, les membres des OP veulent-ils toujours avoir plus d'information et d'explication, non seulement sur les types de sous-projets que BVPI peut appuyer mais également sur l'établissement du budget.

Par rapport au degré de transparence des dépenses liées à la réalisation des sous-projets, il a été jugé comme transparent selon 88% des OP (87% pour A2 et 90% pour C2). En effet, la majorité

des OP tiennent un cahier contenant les dépenses liées au sous-projet ; ainsi que des pièces de dépenses justificatives même pour un faible montant. Pour les personnes ressources, le degré de transparence est moyen (45%) étant donné que les bénéficiaires ne géraient pas directement le budget.

Sur les capacités techniques, institutionnelles et organisationnelles des bénéficiaires, elles sont jugées moyennes. Si on regarde le niveau d'éducation du président des OP bénéficiaires, on peut dire qu'il est assez élevé étant donné que 64% sont du niveau secondaire. Par contre, les OP ont fait parties des membres des institutions de micro-finance seulement à la date où elles ont acquis un appui du Projet pour 93% des OP. En outre, 92% des OP n'ont bénéficié de financement d'autres projets (95% pour A2 et 86% pour C2).

Efficacité du Projet

L'efficacité du Projet a été évaluée à partir de l'évaluation des résultats obtenus, en l'occurrence à travers l'amélioration de la productivité en la comparant avec la situation avant le Projet, ensuite à travers l'accès des bénéficiaires aux divers intrants et services après le Projet ; enfin à partir de la répartition des recettes issues des sous-projets. Au vu de tout cela, le Projet est jugé efficace.

Sur l'amélioration de la productivité et notamment sur le rendement obtenu si on le compare avec la situation avant le Projet, 41% des OP ont jugé qu'elle est moyenne (42% pour A2 et 36% pour C2). Les OP ont observé une augmentation du rendement et donc de la production, ainsi qu'un taux de réussite des plantations et une efficacité des systèmes de lutte anti-érosive. Toutefois, le non maîtrise de l'eau, l'échec de certaines plantations ainsi que le retard du déblocage et l'insuffisance du budget ont constitué en autant de facteurs de blocages. Par contre, les 91% des personnes ressources ont jugé que le Projet a amélioré considérablement la productivité des zones où il y a eu des interventions.

Après la réalisation des sous-projets, 72% des OP ont constaté une amélioration de l'accès aux conseils que ce soit auprès de la DRDR ou des partenaires (71% pour A2 et 73% pour C2). L'accès aux intrants a été considérablement amélioré pour 58% des OP (54% pour A2 et 67% pour C2). Cela est dû à l'existence des fournisseurs d'intrants de proximité et à la fabrication de soi-même des engrais organiques tels que le compost. Toutefois, l'augmentation incessante des prix d'intrants limite leur achat par les bénéficiaires après l'arrêt des appuis du Projet. L'accès aux crédits est moyennement amélioré car il ne s'est pas amélioré et même pas du tout pour 38% des OP (même pourcentage pour A2 et C2) ; contre une amélioration importante constatée par 24% des OP.

Quant à la diminution des surfaces touchées par les feux de brousse après la réalisation du Projet, 83% des OP l'ont constaté (40% pour A2 et 62% pour C2). Elle est surtout due aux sensibilisations des populations locales sur les impacts néfastes des feux, ainsi que suite à la responsabilisation des populations à travers les VOI. Dans cette ligne d'idée, 59% des OP ont constaté une augmentation considérable des surfaces reboisées en raison des reboisements et de la protection de ces boisements par la mise en place des pare-feux (52% pour A2 et 73% pour C2).

Sur le niveau de maîtrise en termes de gestion et de l'élimination des pestes et des pesticides après le Projet, 67% des OP ont avancé que ce niveau a considérablement augmenté (63% pour A2 et 77 pour C2). Ceci est dû à l'application des acquis des formations et des conseils reçus de la part des paysans relais.

Par rapport à la gestion des recettes issues des sous-projets, 38% des OP bénéficiaires de la sous-composante A2 ont acheté des biens communautaires tels que des équipements agricoles ; tandis que 11% des OP ont constitué une épargne mais dans la caisse de l'association même, tandis que 3% seulement des OP l'ont fait dans une institution de micro-finance.

L'évaluation de la part des personnes ressources sur le degré d'atteinte des résultats du Projet est de 50%. Ce chiffre est illustré par les quelques indicateurs suivants : taux de réussite des reboisements (pour la campagne 2013 -14) de 60% à Alaotra Mangoro et 70% pour Itasy; rendement moyen réel obtenu de 5,23 t/ha si rendement attendu de 5t/ha selon le sondage de DRDR (2014) ; réparation des ouvrages à 80% ; amélioration moyenne de la vie associative ; les

ensablements des rizières et le problème de l'irrigation sont toujours intenses et encore observés dans certaines zones.

Impacts du Projet

Les impacts du Projet sont évalués à partir des changements positifs apportés directement ou indirectement par la réalisation des sous-projets, par l'évaluation des effets d'entraînement des résultats ou des acquis des sous-projets, par l'évaluation des évolutions des pratiques techniques après le Projet, de l'état des infrastructures d'irrigation et des rendements obtenus, ainsi que par l'évaluation des prix de vente des produits. Les impacts du Projet sont jugés moyens à élevés.

Les changements observés (A2 et C2) portent sur l'amélioration de la capacité technique des membres pour 83% des OP ; sur l'amélioration du niveau de vie en général des membres pour 73% des OP ; sur l'amélioration du revenu familial pour 72% des OP ; sur l'amélioration de la production/productivité (rendement) pour 56% des OP ; sur l'amélioration de l'autosuffisance alimentaire pour 53% des OP.

Les effets d'entraînement des sous-projets pour la sous-composante A2 sont jugés importants pour 39% des OP et de 26% pour la sous-composante C2.

On a observé une énorme évolution des pratiques techniques sur la riziculture car si avant le Projet les techniques traditionnelles ont été les pratiques habituelles adoptées par plus de 50% des membres des OP (88% des avis des OP), après le Projet, les membres des OP pratiquent des techniques améliorées SRA/SRI selon 86% des OP enquêtées.

Si on regarde l'évolution des systèmes de culture sur les uplands (Système sous couverture végétale), l'intervention du BVPI a permis de changer positivement les systèmes de culture pratiqués sur les uplands pour les bénéficiaires. Selon 57% des OP, les techniques pratiquées par plus des 50% des membres avant l'intervention du projet sont traditionnelles ; tandis qu'après le Projet, seulement 3% des OP enquêtées confirment le maintien de ces techniques traditionnelles.

Quant à l'évolution de la superficie cultivée en riz (rizicultures irriguées en SRA / SRI), ces superficies ont augmenté pour 70% des OP. Ceci est essentiellement dû à l'efficacité des techniques et utilisation des engrais. On observe aussi un constat sur l'augmentation des rendements en riz et par la suite, de l'amélioration de revenu des membres des OP. En effet si on compare avec la situation globale à Madagascar (environ 92% des ménages sont en dessous du niveau de pauvreté sous US\$ 1.25 en 2013), les ménages bénéficiaires du projet BVPI sont bien lotis car avec ce seuil, ils ne sont qu'environ 47% pour la sous-composante A2 et près de 60% pour la sous-composante C2.

L'évolution de la superficie cultivée sur les uplands selon les techniques proposées par le Projet a été aussi observée de façon positive car la superficie a été en hausse pour 57% des OP. Les faits sont expliqués par la disponibilité des engrais et des bonnes semences, ainsi que l'accès aux autres intrants tels que les matériels agricoles. Suite à cela, le rendement rizicole dans le périmètre irrigué a été en hausse pour 84% des OP. Quant aux cultures sur uplands, les rendements agricoles sont en hausse pour 80% des OP suite à l'utilisation des intrants (engrais et pesticides) ainsi que la pratique de l'association culturale.

Depuis l'intervention du Projet, le prix de vente du riz produit par les OP a augmenté pour 22% des OP en raison de l'inflation ou de la concurrence des prix entre les nombreux collecteurs. Toutefois, 28% des OP ont constaté que le prix du riz a baissé en raison de ces collecteurs et de la présence d'un plus grand nombre d'intermédiaires. 50% des OP ont constaté qu'il n'y a eu aucun changement de prix.

Quant à l'évolution des prix de vente des produits agricoles sur uplands, 58% des OP ont constaté une hausse des prix en raison de l'amélioration de la qualité des produits, et suite à l'augmentation de la demande.

Par rapport à l'évolution de l'état des infrastructures d'irrigation dans les périmètres, elle est assez moyenne car avant le Projet 68% des OP (A2) ont perçu l'état fonctionnel de leurs infrastructures, et après le Projet, 77% l'ont constaté.

L'utilisation des matériels agricoles plus performants a augmenté. En effet, 12% des OP ont affirmé que plus de 50% des membres ont utilisé les motoculteurs avant le Projet tandis que 43% des OP l'affirment pour l'après Projet. Il en est de même pour l'utilisation des pulvérisateurs. 16% des OP ont affirmé que plus de 50% des membres ont utilisé des pulvérisateurs mais 33% des OP attestent l'utilisation après le Projet.

Viabilité/pérennité des acquis du Projet

Elle a été évaluée à partir du niveau de réalisation des trois cycles pour la sous-composante A2 ; à partir de la proportion des membres adoptant et s'appropriant des acquis, ainsi que par l'évaluation du degré de pérennisation des acquis par les bénéficiaires. La viabilité est jugée élevée à moyenne.

Généralement, 79% des OP bénéficiaires de la sous-composante A2 n'ont pas pu suivre les trois cycles en raison de manque de moyens financiers selon les OP.

Quant au taux d'adoption et d'appropriation des acquis du Projet par les OP, ce taux est élevé car il est de 70% (même pourcentage pour A2 et C2). Les personnes ressources interviewées ont aussi constaté cette adoption et appropriation des acquis car 78% l'attestent. Pour la sous-composante C2, le taux est de 68%. En effet, les techniques sont faciles à pratiquer et efficaces ; par ailleurs, les paysans ont constaté les avantages des pratiques comme le SRI ou SRA. Quant à la pérennisation des acquis du Projet, les personnes ressources interviewées pensent qu'elle est assurée (71% des interviews pour A2 et 58% pour C2).

Satisfaction des bénéficiaires

La satisfaction des bénéficiaires sur l'intervention du Projet BVPI a été évaluée à partir des actions entreprises par le Projet par rapport à trois indicateurs : priorités de production agricole et de développement en général ; la collaboration avec les autres acteurs partenaires, ainsi que la participation des femmes dans la réalisation des sous-projets. Le niveau d'évaluation par les bénéficiaires pour ces trois indicateurs est élevé à moyenne.

D'une manière générale, 62% des OP sont satisfaites par rapport à l'intervention du Projet BVPI sur les priorités de production agricole et de développement en général. En effet, 63% des OP de la sous-composante A2 sont satisfaites tandis qu'elles sont de 60% pour la sous-composante C2. Elles ont acquis des expériences techniques grâce aux conseils et aux formations reçus et la production s'est améliorée ainsi que le niveau de vie. Toutefois, l'intervention a vu quelques limites, notamment pour l'apport bénéficiaire jugé trop élevé pour le 3^e cycle, le budget insuffisant ainsi que le problème d'écoulement des produits agricoles dans certains cas.

Quant à la collaboration avec les autres acteurs partenaires du Projet, 57% des OP disent être satisfaits. La proportion des OP satisfaites de la sous-composante A2 est plus élevée (64%) par rapport à celle des OP de la sous-composante C2 (43%). Les OP se plaignent surtout de la difficulté qu'elles ont rencontrée pour l'acquisition du fonds auprès de l'agence de microfinance; d'où un décalage entre le déblocage du fonds et le démarrage des activités (retard par rapport au calendrier de culture). Les OP ont fait également des remarques sur la non disponibilité de certains techniciens chargés de suivis des OP lors de la mise en œuvre des sous-projets.

Par rapport à la participation des femmes dans la réalisation des sous-projets, la majorité des OP sont satisfaites (96% des OP ; 95% pour A2 et 98% pour C2). En effet, 46% des membres sont constituées par des femmes. Elles sont jugées responsables et de bonnes conseillères, dynamiques et pleines de volonté.

Problèmes principaux et recommandations par les bénéficiaires

Les principaux problèmes soulevés par les OP lors de la réalisation des sous-projets sont constitués par le déblocage de fonds (retard par rapport au calendrier cultural), le problème sur les apports bénéficiaires (non réalisation pour le cycle 3, montant élevé pour la sous-composante A2) ; le problème de la collaboration avec les IMF (procédures administratives) et l'accès au crédit ; ainsi que l'insuffisance des suivis de la part des partenaires (période très courte et fréquence de

visite assez limitée). Spécifiquement pour les Associations des Usagers de l'Eau, les paysans reconnaissent la persistance des problèmes relatifs au non-recouvrement des entretiens des infrastructures dont la cause principale est l'irrégularité du paiement, voire le non-paiement des cotisations par certains membres.

Pour la sous-composante A2 et pour la sous-composante C2, les recommandations de la part des OP ainsi que de la part des personnes ressources pour des projets similaires ou de développement rural pour le futur sont surtout axées autour de l'encadrement et le suivi des OP pendant et après le Projet, sur l'approche du Projet, sur la sensibilisation plus intense, de la bonne collaboration entre les institutions concernées, de choix des sous-projets en rapport avec les priorités de développement local ou régional, sur le renforcement des capacités techniques et organisationnelles des OP et enfin sur l'accès au crédit.

Annex 6. Stakeholder Workshop Report and Results

Not Applicable.

Annex 7. Summary of Borrower's ICR and Comments on Draft ICR

(a) Summary of Borrower's ICR (executive summary)

Projet Bassins Versants Périmètres Irrigués - Rapport d'Achèvement du Projet, Ministère de l'Agriculture et du Développement Rural, Secrétariat Général, Direction Générale Technique, Programme National Bassins Versants Périmètres Irrigués, Décembre 2014

Résumé Exécutif

Historique du Projet et justification

Le Projet BVPI financé par la Banque Mondiale constitue un des outils de mise en œuvre, à travers le Programme National BVPI, de la politique de développement des Bassins Versants et Périmètres Irrigués adoptée par le Gouvernement de Madagascar en juillet 2006. Il répond à la nécessité d'une approche intégrée de la problématique périmètre irrigué – bassin versant, en associant réhabilitation des réseaux hydroagricoles et intensification agricole, conditions de la croissance, à l'aménagement et la protection des bassins versants, conditions de la durabilité.

Le Projet BVPI est un projet APL prévoyant trois phases de quatre ans chacune financées conjointement par l'IDA et le GEF. Le présent rapport d'achèvement concerne la Phase 1 dite de démarrage mise en vigueur en avril 2007 et dont la date de clôture était initialement fixée au 01/03/2011. L'accord de Crédit IDA 4244 0 MAG, d'un montant de 20,2 millions DTS, a été signé le 26/11/2006, mais les décaissements ont été suspendus de mars 2009 à mai 2010 en application de la directive OP/BP 7.30 relative aux gouvernements de facto. De ce fait, une première restructuration du Crédit IDA a été approuvée le 25/02/2011 : elle consiste en une réallocation des fonds et un report au 31/12/2012 de la date de clôture du crédit IDA. L'Accord de Don du GEF TF093651 n'a pu être signé que le 26/12/2011, pour un montant de 5,9 millions USD et avec le 30/06/2014 pour date de clôture, ce qui a nécessité une seconde restructuration du Crédit IDA consistant en une nouvelle réallocation des fonds et un report de la date de clôture au 30/06/2014 également. Afin de pouvoir achever certains grands travaux d'infrastructures hydrauliques, le Projet BVPI a obtenu de l'IDA une extension de six mois (sans réallocation des fonds), portant ainsi au 31/12/2014 la date de clôture du financement IDA.

Conformément à l'approche « pôles de croissance », la Phase 1 du Projet BVPI a concerné quatre sites à fort potentiel de développement rizicole : la région Itasy, la cuvette d'Andapa (région SAVA), la plaine de Marovoay (région Boeny) et le périmètre de Sahamaloto (région Alaotra Mangoro).

L'**objectif de développement** de la Phase 1 du Projet BVPI IDA-GEF, tel que formulé dans le PAD, est de *poser des bases durables pour l'agriculture irriguée et la gestion des ressources naturelles* au niveau de quatre bassins versants à fort potentiel et des périmètres irrigués associés.

L'**objectif environnemental** global du Projet ³⁷ est *une amélioration de la durabilité environnementale des pratiques de gestion des terres* au niveau des quatre bassins versants cibles.

Les activités menées pour essayer d'atteindre ces objectifs ont été conduites à travers :

- trois composantes techniques couvrant des orientations stratégiques majeures :
 - o Composante A : Développement de l'Agriculture Commerciale,
 - o Composante B : Développement des Périmètres Irrigués,
 - o Composante C : Développement des Bassins Versants,
- une composante de Gestion du Programme,
- et une composante transversale de Sauvegarde Environnementale et Sociale.

³⁷ Pour éviter des répétitions fastidieuses et alléger le texte, les termes « Projet » et « Projet BVPI » seront employés dans la suite du présent document pour désigner la Phase 1 du Projet BVPI.

Chacune des trois composantes techniques a comporté deux sous-composantes :

- une sous-composante d'appui, financée à 100 % par le Projet,
- une sous-composante d'investissement, par la mise en œuvre de sous-projets à frais partagé

Principaux facteurs affectant la performance du Projet

Les évènements politiques de début 2009 ont entraîné

- la suspension des décaissements de la Banque Mondiale de mars 2009 à mai 2010, et donc la perte de deux campagnes de saison des pluies et de contre-saison,
- le report de la signature de l'Accord de Don du GEF, et donc l'impossibilité de mener les actions éligibles à son financement, jusqu'à ce que l'IDA, en juillet 2010, accepte de les prendre provisoirement en charge.

Le financement à 80 % en cycle 1 des sous-projets d'intensification a suscité une forte demande, renforcée ensuite par les bons rendements obtenus. Il en a résulté un fort accroissement du nombre de sous-projets, et par conséquent un effet de tache d'huile significatif qui a permis une augmentation de 1,7 T/ha du rendement moyen en paddy des périmètres.

Mais ce fort engouement pour les sous-projets en cycles 1 et 2 a également obligé le Projet à diffuser des paquets techniques (surtout SRA et SRI) très standardisés (avec quelques variantes régionales), sans pouvoir s'attacher aux spécificités de chaque bénéficiaire et en devant recourir, pour assurer un appui et un suivi le plus rapproché possible, à des paysans-relais, courroie de transmission entre les techniciens des Partenaires Stratégiques et les Organisations Paysannes.

Le recours à des Partenaires Stratégiques a été un facteur déterminant des succès obtenus par le Projet : il a permis de suppléer au manque criant de personnel de terrain des DRDR, tout en assurant un renforcement des capacités et une redynamisation de leurs cadres.

L'obligation initialement faite aux AUE de prendre en charge 20 % du coût des travaux de réhabilitation des ouvrages transférables a été un frein à la réhabilitation des périmètres irrigués, qui a été fort heureusement levé par l'adoption du MAPER, conjointement à la signature tripartite AUE-DRDR-Commune) des contrats-plans pluriannuels (CPPA).

La concentration des actions sur uplands dans des sous-bassins versants modèles a permis d'éviter la dispersion géographique des interventions et leur dilution dans l'espace ; elle a permis de démontrer la faisabilité et l'intérêt d'un aménagement complet, sur l'ensemble de leur toposéquence, de sous-bassins versants soigneusement sélectionnés pour leur accessibilité et visibilité.

Principaux résultats

Composante A

Le Projet s'est concentré sur le financement de sous-projets d'intensification à frais partagés au profit d'exploitants agricoles structurés en organisations paysannes. Chaque sous-projet devait être subventionné par le Projet de manière dégressive sur 3 cycles de culture successifs pour les cultures annuelles, et sur deux années pour les spéculations arboricoles.

Sur les périmètres irrigués :

12 331 exploitants (dont 44 % de femmes) représentant 54 % de l'effectif total des usagers des périmètres ont participé au cycle 1 d'un total de 1 508 sous-projets d'intensification rizicole (SRI, sur Sahamaloto ; SRA sur les 3 autres sites d'intervention du Projet) sur une superficie totale de 5 456 ha représentant 27 % de la superficie des périmètres.

9 040 d'entre eux (dont 43 % de femmes) ont poursuivi l'intensification en cycle 2 sur une superficie totale de 3 936 ha à travers 1 136 sous-projets.

Seuls 163 sous-projets sont allés jusqu'en cycle 3 : ils concernent seulement 1 327 exploitants (dont 42 % de femmes) et 508 ha.

Alors que le rendement moyen de référence (en 2006) était de 2,7 tonnes de paddy/ha, les rendements moyens en paddy obtenus en saison principale 2013-2014 sont les suivants :

- Sur sous-projets (tous cycles confondus) : 5,87 T/ha
- Hors sous-projets : 4,32 T/ha
- En moyenne : 4,43 T/ha

L'augmentation significative du rendement moyen hors sous-projets témoigne à la fois de l'effet tâche d'huile provoqué par les sous-projets et du fait que les OP ayant quitté le système avant le cycle 2 ou le cycle 3 n'ont pas complètement abandonné les techniques vulgarisées à travers les sous-projets.

Le supplément de production de paddy (par rapport à la situation avant Projet) a été, pour la saison principale 2013-2014, estimé à plus de 32 000 tonnes de paddy.

Sur les bassins versants dominant les périmètres :

3 394 exploitants (dont 44 % de femmes) ont bénéficié du cycle 1 d'un total de 427 sous-projets sur une superficie totale de 666 ha. Dans ces totaux, les cultures SCV représentent 398 ha cultivés par 1 980 bénéficiaires répartis dans 248 OP.

Pour les sous-projets SCV, la déperdition après le cycle 1 a été très forte, puisque, en cycle 2, on ne trouve plus que 46 sous-projets mis en œuvre sur 113 ha par 411 bénéficiaires. Cette très forte déperdition est due à la complexité même du SCV et à un appui technique largement insuffisant pour promouvoir un paquet technique aussi innovant.

Composante B

19 972 ha de périmètres irrigués ont bénéficié des appuis du Projet.

88 AUE ont été formées, officialisées et équipées de documents de gestion divers.

73 contrats-plans pluriannuels ont été signés et 100 millions MGA ont été réunis au titre du MAPER depuis que ce dernier a été instauré (fin 2012).

Le Projet a fait réaliser par des consultants 21 études d'APD/DAO/EIES³⁸ portant sur 19 522 ha de périmètres pour un coût total d'environ 1,6 milliards MGA entièrement pris en charge par l'IDA.

44 chantiers de réhabilitation (de construction, dans le cas d'Ankaibe) concernant 19 010 ha ont été financés par l'IDA pour un montant total d'environ 21,4 milliards MGA (et une participation des usagers de 609 millions MGA, avant instauration du MAPER).

Le contrôle-surveillance des travaux et l'élaboration du MGE ont généralement été assurés par le Consultant ayant procédé aux études.

Grâce à ces travaux, 14 049 ha bénéficient fin 2014 d'une bonne maîtrise de l'eau.

La collecte des redevances reste nettement en deçà des prévisions des CPPA : pour la saison 2013-2014, 275 millions MGA seulement ont été collectés (ou prestés en travail) sur un objectif de 458 millions MGA : il s'agit d'un effort significatif, mais non suffisant pour assurer la pérennité des réseaux.

Composante C

Les actions ont été focalisées sur 17 sous-bassins versants modèles totalisant 1 128 ha et mis en valeur par 6 022 utilisateurs structurés en 666 GGDT. Pour chacun de ces SBV modèle a été élaboré de manière participative un plan de zonage décrivant la situation d'occupation

³⁸ précédées d'un APS dans le cas d'Ankaibe.

des sols avant intervention du Projet, puis un schéma d'aménagement de l'ensemble de la toposéquence du SBV, dans l'objectif de démontrer la possibilité et l'intérêt d'un aménagement complet de SBV.

Cependant, les actions de traitement de points noirs d'érosion et de reboisement ont largement dépassé le cadre des sous-BV modèles.

117 ouvrages stratégiques antiérosifs ont été réalisés (dont 81 traitements de lavaka et 14 protections de berges de rivière), d'un coût de 2,5 milliards MGA pour la Banque Mondiale (et seulement 7 millions MGA pris en charge par les bénéficiaires).

1 853 sous-projets de revégétalisation (dont 1 737 sous-projets Reboisement et 73 sous-projets Pépinière Forestière) ont concerné 16 426 bénéficiaires (dont 42 % de femmes) et coûté 4,3 milliards MGA financés par la Banque Mondiale et 200 millions MGA pris en charge par les bénéficiaires.

Niveau d'atteinte des objectifs de développement du Projet

L'**objectif de développement** de la Phase 1 du Projet BVPI IDA-GEF, tel que formulé dans le PAD, est de *poser des bases durables pour l'agriculture irriguée et la gestion des ressources naturelles* au niveau de quatre bassins versants à fort potentiel et des périmètres irrigués associés.

Ainsi qu'il ressort du tableau ci-dessous, la quasi-totalité des objectifs de résultat par rapport à l'objectif de développement ont été dépassés.

Seul l'objectif de superficies exploitées en contre-saison semble ne pas avoir été atteint, car le résultat affiché de fin de Projet ne mesure que les superficies des sous-projets d'intensification, à l'exclusion des superficies hors sous-projets, qui n'ont pas pu être recensées (à la différence de la plaine de Marovoay, seule une partie de la superficie des périmètres d'Itasy et de SAVA est exploitée en contre-saison).

Indicateurs de résultats pa rapport à l'Objectif de Développement du Projet	Unité	Référence début du Projet (2006)	Objectifs 30/06/2014 (2 ^e restructuration)	Réalisations fin 2014
Superficies concernées par les nouvelles technologies et/ou les intrants améliorés à travers les sous-projets	Ha	0	5 175	6 122
Bénéficiaires directs du Projet	Nbre	0	13 130	22 790
dont femmes	%		20	27
Superficies cumulées bénéficiant des services d'irrigation et de drainage en saison principale	Ha	0	13 362	14 029
Superficies sous système de gestion durable des terres dans les zones de Projet	Ha	0	2 051	3 018
Superficies exploitées en contre-saison dans les périmètres touchés par le Projet	Ha	1 120	4 150	1 802
	%	nd	25	nd

Performance de la Banque Mondiale et de l'Emprunteur

14 missions de supervisons ont été organisées par la Banque Mondiale (non compris les deux missions individuelles de mars et juillet 2013). Toutes ces missions, à l'exception des deux missions individuelles précitées, ont été conduites par M. Ziva RAZAFINTSALAMA, Task Team Leader du Projet BVPI auprès de la Représentation de la Banque Mondiale à Madagascar. La périodicité de deux missions par an a été ainsi globalement respectée. Les missions de terrain ont été organisées avec le souci d'une égale fréquence de visite des quatre sites du Projet.

Le Projet a également participé à deux revues du portefeuille des projets de la Banque Mondiale, les 26-27/03/2012 et le 21/05/2013. A ces deux revues, le Projet a obtenu la notation Modérément Satisfaisant.

La mission de supervision de septembre 2011 a été l'occasion de la revue à mi-parcours du Projet.

La mission de décembre 2014 avait, entre autres, pour objectif d'assurer la bonne clôture du Projet BVPI. A l'issue de cette dernière mission, la notation Satisfaisant a été donnée à chaque composante et volet du Projet.

La Banque Mondiale a assuré un suivi rapproché des activités du Projet : l'aide-mémoire de chaque mission a comporté des recommandations faites pour chacun des volets du Projet par les experts concernés sous la forme de plans d'actions à mettre en œuvre dans des délais définis. En début de chaque mission, le Projet a fait un compte-rendu de l'exécution des recommandations formulées par la mission précédente.

Les cadres du Ministère de l'Agriculture ont activement participé à la conception et à la préparation du Projet, en 2005 et 2006. Et les deux restructurations du Crédit IDA et la finalisation de l'Accord de Don du GEF ont été le fruit d'une étroite collaboration entre l'équipe de la CelCo et celle de la Représentation de la Banque Mondiale chargée du pilotage opérationnel du Projet.

Le Projet a bénéficié d'un appui constant du Secrétaire Général du Ministère et d'une très forte implication des responsables de l'UGPM, en particulier du PRMP. Les deux directeurs centraux de l'Agriculture et du Génie Rural, responsables respectivement des composantes A et B, n'ont pas, du fait de leurs multiples activités, été en mesure de consacrer au Projet BVPI autant de temps que souhaité, mais n'ont pas manqué de participer activement à toutes les missions de supervision de la Banque Mondiale.

La responsabilisation entière des équipes DRDR dans la mise en œuvre du Projet a permis une appropriation du Projet par ces cadres, ainsi qu'un renforcement de leurs capacités, et permet d'espérer une poursuite des actions par ces derniers, pour peu que les moyens nécessaires leur soient fournis.

Principales leçons tirées

En voulant atteindre un maximum d'exploitants à travers les sous-projets d'intensification agricole, le Projet s'est exposé au risque de subventionner certains groupements opportunistes qui abandonneraient le système dès après le cycle 1, et s'est condamné, vu la faible densité d'encadrement (malgré le recrutement de Partenaires Stratégiques et le recours à des paysans-relais) à vulgariser des thèmes et paquets techniques très standardisés ne répondant pas forcément aux préoccupations et contraintes spécifiques de chaque exploitant ou groupement d'exploitants. Il apparaît opportun d'imaginer une approche plus personnalisée d'un nombre limité de bénéficiaires représentatifs, dont les parcelles serviront de lieux de démonstration et d'apprentissage,

Les techniques agro-écologiques (SCV, agroforesterie) n'ont pas connu le succès espéré, parce que les personnels chargés de leur vulgarisation n'avaient ni les compétences et l'expérience nécessaires, ni le temps pour assurer la formation et le suivi très rapproché que nécessite l'introduction de cette pratique particulièrement innovante.

Pour éviter les problèmes de retard de décaissement rencontrés, il convient de fixer de façon plus rigoureuse les dates buttoirs d'élaboration et de signature des contrats de financement des sous-projets d'intensification, même s'il faut pour cela rejeter les dossiers retardataires : il est préférable de perdre quelques sous-projets plutôt que de financer des sous-projets qui souffriront de retard (voire d'absence) de mise en application de certains intrants.

Les collectes de redevances pour fonctionnement, gestion et entretien des réseaux hydroagricoles restent largement inférieures aux montants nécessaires (approuvés dans les CPPA) pour assurer la pérennisation des infrastructures. Un des moyens d'améliorer le versement de ces redevances serait de rapprocher l'utilisateur de la structure qui gère sa portion de réseau, en initiant une fragmentation en unités plus petites des AUE dont l'effectif dépasse 150-200 membres.

La gestion de l'eau doit être améliorée, en particulier en début de campagne, lorsque les besoins théoriques pour l'irrigation des pépinières sont peu importants, mais que la consommation devient extrême, du fait de la dispersion de ces dernières.

Les opérations de reboisement méritent d'être poursuivies, mais avec une plus grande responsabilisation et implication des bénéficiaires, dont la motivation pour le reboisement doit ainsi être concrétisée.

L'organisation institutionnelle consistant à confier la maîtrise d'œuvre des activités aux DRDR, tout en les appuyant par une assistance technique, a démontré son intérêt pour l'appropriation du Projet par les cadres de la DRDR. Cependant, les responsabilités et obligations respectives des partenaires (assistants techniques, partenaires stratégiques, consultants divers, ...) et des agents de la DRDR méritent d'être mieux précisées et appliquées.

La mise en œuvre des sous-projets a démontré le vif intérêt des femmes pour les actions du Projet. Les interventions ultérieures devraient mieux prendre en considération ce facteur en attachant plus d'importance à la question du genre.

(b) Borrower's Comments on Draft ICR

En général, le projet a réalisé les objectifs assignés malgré les difficultés qu'il a rencontrées pendant cette phase 1. La non prolongation du projet en système APL (trois phases de quatre ans) fait que le jugement a été porté isolément sur la durée de cette phase.

L'évaluation de risque mentionnée comme « Forte » résulte de l'environnement politique que le projet ne maîtrise pas et de la dimension (argent et en temps) car beaucoup de choses prévues avant le projet ont été supprimées ou n'ont pas été priorisées (diversification, marketing,...).

Les points forts que le projet a réalisés n'ont pas été aussi bien décortiqués et mis en exergue que les points faibles (sauvegarde environnementale et fiduciaires).

L'Etat a participé à la hauteur de 500 Millions d'Ariary pour les indemnités et la réparation relatives au déplacement de population lors de travaux sur le barrage d'Ankaibe, 423 Millions d'Ariary pour les travaux d'urgence sur la réparation des brèches sur ce périmètre (cf paragraphe 53, page 26 –Rapport ICR). Ces montants même modestes doivent être figurés dans le tableau Annexe 1 de ce rapport.

Pour nous, la notation « Satisfaisante » peut être aussi être donné à la place de « Modérément insatisfaisante » telle que l'évaluateur a proposé.

Annex 8. Comments of Cofinanciers and Other Partners/Stakeholders

Le Programme National Bassins Versants – Périmètres Irrigués, qui inclut le projet BVPI financé par la Banque et deux projets financés par l'AFD³⁹, a fait l'objet d'une évaluation indépendante en 2014-2015 (AGRER 2015). Les conclusions principales de cette étude sont cohérentes avec celles de cet ICR:

- Des méthodes et outils prometteurs ont été testés tant au niveau des périmètres irrigués que des bassins versants (schémas directeurs, plans d'aménagement, contrats de plan pluri-annuels, MAPER, *dina*, paysans-relais, registres parcellaires, etc.);
- Des pouvoirs locaux ont été légitimés et renforcés et leurs responsabilités formalisées (Associations d'Usagers de l'Eau, CORES, Communes, DRDR, CSA, etc.);
- L'insertion du projet Banque mondiale/BVPI dans les structures de l'Etat a été un facteur important d'appropriation par la partie nationale;
- Les avancées sur le cadre institutionnel et réglementaire restent néanmoins réduites et fragiles tant que les textes réglementaires régissant le secteur de l'irrigué ne sont pas vulgarisés, que les modalités de co-financement des travaux ne sont pas établies (FERHA, FRDA, ressources des collectivités territoriales décentralisées) et que l'appui socio-organisationnel aux Associations d'Usagers de l'Eau et GGDT n'est pas assuré dans la durée; les résultats tendent à se fragiliser quand les structures projets se retirent, d'autant que la présence d'un projet ne s'est pas nécessairement traduite par une augmentation des effectifs de techniciens au sein des DRDR;
- L'importance de l'approche conseil à l'exploitation a été mise en évidence, ainsi que la nécessité d'une approche différenciée selon les conditions agro-économiques des exploitations, mais la forme et l'organisation institutionnelle de services de conseil pérennes restent à définir; le conseil agricole constitue un enjeu-clé de la durabilité des acquis, mais également de leur mise à l'échelle;
- De même, une approche filière avec lien avec l'amont et l'aval (secteur privé) et les institutions de crédit est essentielle;
- L'approche micro-projets subventionnés a produit des résultats mitigés; ils ont généré un intérêt souvent opportuniste mais n'étaient pas forcément adaptés (faible rentabilité du travail) ou à la portée des bénéficiaires (besoins en main d'œuvre et en financement);
- Les investissements sur bassins versants ont produits des résultats généralement insignifiants en matière de transformation du paysage (pour le projet Banque mondiale/BVPI, les schémas d'aménagement et les sous-projets Culture Sous Couvert Végétal ont représenté respectivement 2% et 0,2% de la superficie totale des bassins versants);
- La pérennisation de l'entretien des aménagements sur bassins versants reste à assurer, en accordant une place centrale à la question foncière et aux outils de financement (FRDA);

³⁹ Projet Bassins Versants - Périmètres Irrigués Sud-Est Hauts-Plateaux et Projet Bassins Versants Lac.

- Le traitement des problèmes d'ensablement des périmètres irrigués et de leurs retenues nécessite des actions d'envergure passant par une approche interministérielle;
- La question de la mise à l'échelle des résultats de cette phase de "recherche-action" reste donc entière;
- La CelCo, qui devait initialement coordonner les différentes initiatives dans le domaine du Programme National BVPI, est devenue une unité de projet pour la BM et n'a pas joué de rôle en matière de coordination/capitalisation/réorientation du programme, d'autant que sa légitimité en ce sens n'a jamais été confirmée et que les moyens ne lui ont jamais été donnés pour le faire (en particulier, absence d'outil de Suivi & Evaluation);
- Il est nécessaire de refonder la stratégie nationale BVPI en capitalisant les enseignements fournis par l'ensemble des initiatives en la matière, y compris celles qui ont été développées en dehors du PN-BVPI (BAD/Bas-Mangoky, PAPRIZ, PLAE, etc.);
- En particulier, la nouvelle stratégie devra prendre en compte les nouvelles conditions qui prévalent au sein des périmètres irrigués (fragmentation des parcelles, diversité et complexité des modes de faire-valoir, hétérogénéité de l'accès à l'eau, politisation des Associations d'Usagers de l'Eau, faible implication des services de l'Etat et des collectivités territoriales décentralisées, etc.), qui aujourd'hui rendent tout investissement aléatoire et risqué.

Annex 9. List of Supporting Documents and Datasets

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Maps

