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INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

IMPLEMENTATION COMPLETION AND RESULTS REPORT  
(TF-99539)

ON A

GLOBAL ENVIRONMENT FACILITY TRUST FUND GRANT  
FROM THE SPECIAL CLIMATE CHANGE FUND

IN THE AMOUNT OF US\$4,345,454

TO THE

KINGDOM OF MOROCCO

FOR AN

INTEGRATING CLIMATE CHANGE IN THE IMPLEMENTATION OF THE PLAN MAROC  
VERT PROJECT

April 7, 2016

Agriculture Global Practice  
Morocco Country Management Unit  
Middle East and North Africa Region

KINGDOM OF MOROCCO – GOVERNMENT FISCAL YEAR  
January 1 – December 31

**CURRENCY EQUIVALENTS**

(Exchange rate effective as of April 7, 2016)  
US\$ 1 = MAD 9.63

**ABBREVIATIONS AND ACRONYMS**

ADA	Agency for Agricultural Development ( <i>Agence pour le développement agricole</i> )
CC	Climate Change
CPS	Country Partnership Strategy
CRPII	Pillar 2 Resources Center ( <i>Centre des ressources Pilier II</i> )
DPA	Provincial Agricultural Directorate ( <i>Direction provinciale de l'agriculture</i> ) of the MAPM
DPL	Development Policy Loan
DRA	Regional Agricultural Directorate ( <i>Direction régionale de l'agriculture</i> ) of the MAPM
ESMP	Environmental and Social Management Plan
GDP	Gross Domestic Product
GEF	Global Environmental Facility
GoM	Government of Morocco
ICR	Implementation Completion and Results Report
ISR	Implementation Status and Results Report
INRA	National Institute for Agronomic Research ( <i>Institut national de la recherche agronomique</i> )
MAPM	Ministry of Agriculture and Fisheries ( <i>Ministère de l'agriculture et de la pêche maritime</i> )
M&E	Monitoring and Evaluation
MEF	Ministry of Economics and Finance ( <i>Ministère de l'économie et des finances</i> )
MTR	Mid-Term Review
ONCA	National Institute for Extension Services (Office National du Conseil Agricole)
PDO	Project Development Objective
PICCPMV	Integrating Climate Change in the implementation of the <i>Plan Maroc Vert</i> Project ( <i>Projet d'intégration du changement climatique dans la mise en oeuvre du Plan Maroc Vert</i> )
PIU	Project Implementation Unit
PMV	Green Morocco Plan ( <i>Plan Maroc Vert</i> )
SCCF	Special Climate Change Fund
TTL	Task Team Leader

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**KINGDOM OF MOROCCO**  
**Integrating Climate Change in the Implementation of the Plan Maroc Vert Project**

**CONTENTS**

Data Sheet	
A. Basic Information.....	4
B. Key Dates.....	4
C. Ratings Summary.....	4
D. Sector and Theme Codes.....	5
E. Bank Staff.....	5
F. Results Framework Analysis.....	6
G. Ratings of Project Performance in ISRs.....	8
H. Restructuring.....	8
I. Disbursement Graph.....	9
1. Project Context, Global Environment Objectives and Design.....	10
2. Key Factors Affecting Implementation and Outcomes.....	14
3. Assessment of Outcomes .....	23
4. Assessment of Risk to Development Outcome.....	29
5. Assessment of Bank and Borrower Performance.....	29
6. Lessons Learned.....	32
7. Comments on Issues Raised by Borrower/Implementing Agencies/Partners.....	34
Annex 1. Project Costs and Financing .....	35
Annex 2. Outputs by Component.....	36
Annex 3. Economic and Financial Analysis .....	55
Annex 4. Bank Lending and Implementation Support/Supervision Processes.....	57
Annex 5. Beneficiary Survey Results .....	59
Annex 6. Stakeholder Workshop Report and Results.....	70
Annex 7. Summary of Borrower's ICR and/or Comments on Draft ICR .....	71
Annex 8. Comments of Cofinanciers and Other Partners/Stakeholders .....	85
Annex 9. List of Supporting Documents.....	86

**KINGDOM OF MOROCCO**  
**Integrating Climate Change in the Implementation of the Plan Maroc Vert Project**

**ICR DATA SHEET**

<b>A. Basic Information</b>			
Country:	Morocco	Project Name:	Integrating Climate Change in the Implementation of the Plan Maroc Vert
Project ID:	P117081	L/C/TF Number(s):	TF-99539
ICR Date:	04/07/2016	ICR Type:	Core ICR
Lending Instrument:	SIL	Borrower:	GOVERNMENT OF MOROCCO
Original Total Commitment:	USD 4.35M	Disbursed Amount:	USD 4.26M
Revised Amount:	USD 4.26M		
<b>Environmental Category: B</b>		<b>Global Focal Area: C</b>	
<b>Implementing Agencies:</b> Agence pour le Développement Agricole (ADA)			
<b>Cofinanciers and Other External Partners:</b>			

<b>B. Key Dates</b>				
Process	Date	Process	Original Date	Revised / Actual Date(s)
Concept Review:	06/15/2010	Effectiveness:		10/21/2011
Appraisal:	03/16/2011	Restructuring(s):		10/30/2014
Approval:	05/17/2011	Mid-term Review:	09/30/2013	10/08/2013
		Closing:	10/15/2015	10/15/2015

<b>C. Ratings Summary</b>	
<b>C.1 Performance Rating by ICR</b>	
Outcomes:	Satisfactory
Risk to Global Environment Outcome	Moderate
Bank Performance:	Moderately Satisfactory
Borrower Performance:	Satisfactory

<b>C.2 Detailed Ratings of Bank and Borrower Performance</b>			
Bank	Ratings	Borrower	Ratings
Quality at Entry:	Moderately Satisfactory	Government:	Satisfactory
Quality of Supervision:	Satisfactory	Implementing Agency/Agencies:	Satisfactory
<b>Overall Bank Performance:</b>	Moderately Satisfactory	<b>Overall Borrower Performance:</b>	Satisfactory

<b>C.3 Quality at Entry and Implementation Performance Indicators</b>			
<b>Implementation Performance</b>	<b>Indicators</b>	<b>QAG Assessments (if any)</b>	<b>Rating</b>
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	Satisfactory		

<b>D. Sector and Theme Codes</b>		
	<b>Original</b>	<b>Actual</b>
<b>Sector Code (as % of total Bank financing)</b>		
Agricultural extension and research	40	40
Crops	15	15
Irrigation and drainage	15	15
Public administration- Agriculture, fishing and forestry	30	30
<b>Theme Code (as % of total Bank financing)</b>		
Climate change	100	100

<b>E. Bank Staff</b>		
<b>Positions</b>	<b>At ICR</b>	<b>At Approval</b>
Vice President:	Hafez M. H. Ghanem	Shamshad Akhtar
Country Director:	Marie Francoise Marie-Nelly	Neil Simon M. Gray
Practice Manager/Manager:	Steven N. Schonberger	Hoonae Kim
Project Team Leader:	Gabriella Izzi	Gabriella Izzi
ICR Team Leader:	David Olivier Treguer	
ICR Primary Author:	Marjory-Anne Bromhead	

## F. Results Framework Analysis

### Global Environment Objectives (GEO) and Key Indicators(as approved)

The objective of the project was to strengthen the capacity of public and private institutions and of farmers to integrate climate change adaptations in projects directed to small farmers in the project area.

### Revised Global Environment Objectives (as approved by original approving authority) and Key Indicators and reasons/justifications

To fill out if applicable.

#### (a) GEO Indicator(s)

Indicator	Baseline Value	Original Target Values (from approval documents)	Formally Revised Target Values	Actual Value Achieved at Completion or Target Years
<b>Indicator 1 :</b>	Percentage of Pillar II Projects in the five target regions integrating at least one climate change adaptation			
Value (quantitative or Qualitative)	0	36%		45.9%
Date achieved	05/17/2011	05/18/2011		06/30/2015
Comments (incl. % achievement)	Reported results achieved were greater than the targets.			
<b>Indicator 2 :</b>	Percentage of small farmers in the selected Pillar II Projects integrating at least one climate change adaptation.			
Value (quantitative or Qualitative)	0	35%		43.2%
Date achieved	05/17/2011	05/18/2011		06/30/2015
Comments (incl. % achievement)	Reported results achieved were greater than the targets.			
<b>Indicator 3 :</b>	Direct beneficiaries Percent female			
Value (quantitative or Qualitative)	NA	NA; NA		NA
Date achieved	11/30/2012	12/01/2012		06/30/2015
Comments (incl. % achievement)	Core indicator added after project approval, recorded as zero in late 2013 ISR but not recorded in last two ISRs.			

#### (b) 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
<b>Indicator 1 :</b>	Number of staff of public institutions trained (cumulative).			
Value (quantitative or Qualitative)	0	120		264
Date achieved	05/17/2011	05/18/2011		06/30/2015

Comments (incl. % achievement)	Final target achieved and largely exceeded at 220%.		
<b>Indicator 2 :</b>	Number of staff of private institutions trained (cumulative)		
Value (quantitative or Qualitative)	0	100	197
Date achieved	05/17/2011	05/18/2011	06/30/2015
Comments (incl. % achievement)	Final target achieved and largely exceeded at 197%.		
<b>Indicator 3 :</b>	Number of farmers in PICCPMV sub-projects integrating at least one climate change adaptation.		
Value (quantitative or Qualitative)	0	2500	2423
Date achieved	05/17/2011	05/18/2011	06/30/2015
Comments (incl. % achievement)	Target achieved at 97%		
<b>Indicator 4 :</b>	Number of farmers in PICCPMV sub-projects benefiting from training & awareness activities.		
Value (quantitative or Qualitative)	0	3200	3215
Date achieved	05/17/2011	05/18/2011	06/30/2015
Comments (incl. % achievement)	Target achieved at 100%		
<b>Indicator 5 :</b>	Clients adopting an improved agricultural technology promoted by project (core indicator added 2012: like component 2indicator 1).		
Value (quantitative or Qualitative)	-	2500	2423
Date achieved	11/30/2012	12/01/2012	06/30/2015
Comments (incl. % achievement)	Target achieved at 97%. Core indicator corresponding to intermediate indicator 3, added in the ISRs starting in 2012 for corporate monitoring purposes only and without any restructuring.		
<b>Indicator 6 :</b>	Clients adopting an improved agricultural technology promoted by the project (percent female): core indicator		
Value (quantitative or Qualitative)	-	Not yet disaggregated	2% (42 women)
Date achieved	11/30/2012	12/01/2012	06/30/2015
Comments (incl. % achievement)	Adaptation measures chosen were not generally those where women play the lead role in Moroccan agriculture. Added in the ISRs starting in 2012 for corporate monitoring purposes only, no restructuring took place.		

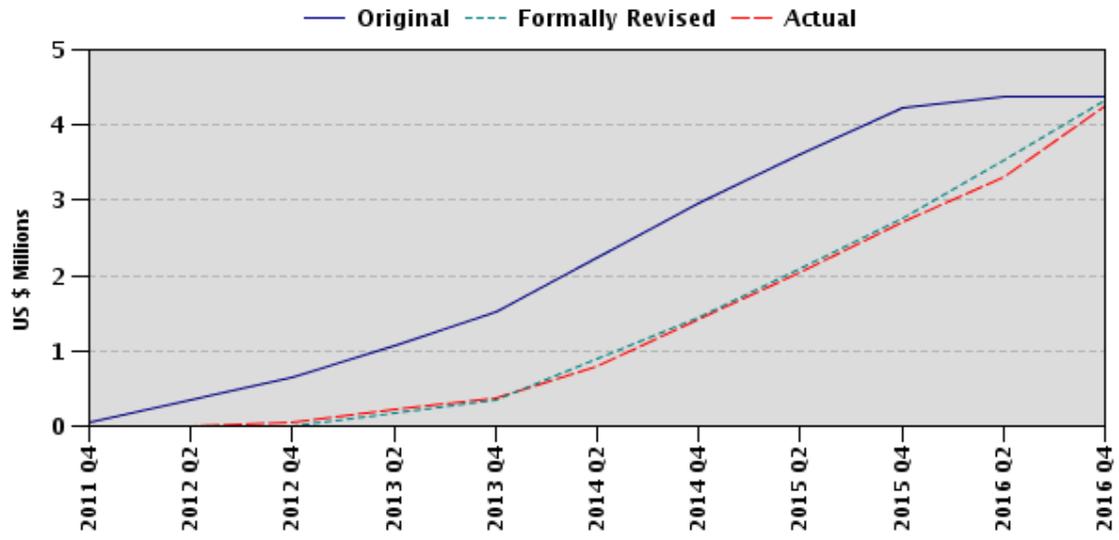
### G. Ratings of Project Performance in ISRs

No.	Date ISR Archived	GEO	IP	Actual Disbursements (USD millions)
1	06/30/2011	Moderately Satisfactory	Moderately Satisfactory	0.00
2	12/13/2011	Satisfactory	Satisfactory	0.00
3	03/14/2012	Satisfactory	Moderately Satisfactory	0.00
4	12/26/2012	Satisfactory	Moderately Satisfactory	0.22
5	07/31/2013	Satisfactory	Moderately Satisfactory	0.39
6	12/09/2013	Satisfactory	Moderately Satisfactory	0.71
7	06/08/2014	Satisfactory	Moderately Satisfactory	1.39
8	11/25/2014	Satisfactory	Satisfactory	1.97
9	04/28/2015	Satisfactory	Satisfactory	2.56
10	10/06/2015	Satisfactory	Satisfactory	2.91

### H. Restructuring (if any)

Restructuring Date(s)	Board Approved GEO Change	ISR Ratings at Restructuring		Amount Disbursed at Restructuring in USD millions	Reason for Restructuring & Key Changes Made
		GEO	IP		
10/30/2014	N	S	MS	1.89	1. Reallocation between categories to account for cancellation of two categories of expenditure. 2. Change in component and costs, consequence of reallocation between disbursement categories. 3. Change in disbursement estimates.

## I. Disbursement Profile





## 1. Project Context, Global Environment Objectives and Design

### 1.1 Context at Appraisal

1. **Morocco had a solid record of economic growth and poverty reduction at appraisal.** Growth averaged 4.6 percent per annum in the 2000-2009 period,<sup>1</sup> and there were declines in absolute poverty including in rural poverty, due largely to a stable political macro-economic framework, investments in infrastructure, agricultural growth, economic diversification, progress in access to social services and remittances. There had also been progress in decentralization, increased government accountability and local participation in development actions. Nonetheless, people living in rural areas, comprising 43 percent of the population, accounted for two-thirds of those living below the poverty line, and the livelihoods of nearly 40 percent of the population remained insecure.

2. **Agriculture accounts for 15 percent of GDP but nearly half of employment and 23 percent of exports, while characterized by a dualistic nature.** A relatively small number of highly efficient, commercial farmers, many of them using irrigation, produce high-value horticultural crops for export and milk for the domestic market. They account for nearly half of Morocco's agricultural value added and 75 percent of agricultural exports. The second, much larger group comprises small-holdings, many semi-subsistence cereal farms with low productivity, poor quality produce and limited market integration. These farms are largely rainfed and vulnerable to recurrent droughts. They often have aging household heads with a low education level (more than 45 percent of the heads of farming families are over 55 years old), who make limited use of modern technologies and lack technical know.

3. **Morocco's agricultural sector is vulnerable to climate variability and change.** Agricultural GDP (and indeed total GDP) is closely correlated with precipitation. Since 1960 average temperatures have increased by 0.16 degrees centigrade, and there have been declines in average precipitation together with increasing variability and unpredictability in rainfall. Average precipitation is expected to decrease by 20 percent by 2050 and 40 percent by 2080 according to some projections, and average temperatures to increase by three degrees centigrade by 2080.<sup>2</sup> Without technology change, average rainfed cereal yields could fall by 24 percent by 2050. There is also substantial variation between regions, as regards both present and future vulnerabilities, with the east and north-east likely to experience the greatest temperature rises. The 2010 WDR (World Development Report) ranks Morocco amongst the countries for which climate change will have the greatest impact on yields. Improved land and water management including water and soil moisture conservation, development of crop and livestock systems which are more resilient to drought and extreme weather conditions, are priorities for the sector, especially for the smaller farmers whose systems are largely rainfed and who lack know-how and financial resources. The World Bank 2010-13 CPS (Country Partnership Strategy) includes a pillar on Sustainable Development in a Changing Climate with a strong focus on improved land and water management in agriculture as well as on renewable energy.

4. **Recognizing the importance of agriculture to inclusive growth and poverty reduction, the Government has developed a guiding framework for agricultural sector development from 2009 to 2020, the Plan Maroc Vert (PMV).** Its overarching objective is to double

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<sup>1</sup> It has since decreased to 3.6% per annum over the 2009-2015 period, but with strong agricultural growth rates being sustained. Source: Morocco CPS 2014-17. These figures were compiled, however, before the 2015-16 drought.

<sup>2</sup> World Bank - Morocco study on the impact of climate change on the agricultural sector 2009: René Gommès, FAO/NRC Tarik El Hairech, DMN Damien Rosillon, consultant Riad Balaghi, INRA Hideki Kanamaru, FAO/NRC

agricultural value added over 12 years, through a series of policy and investment actions designed to increase market integration, promote private sector investment, increase productivity and improve natural resource management and integrate production and value chains. It takes account of the duality of the sector through a two-pillar program. Pillar 1, with 955 projects planned, supports the integration of commercial farmers into the world economy, while Pillar 2, with 545 projects, helps small farmers overcome their traditional constraints through support to enhanced productivity, diversification and value chain development. Investments of US\$2.37 billion under Pillar 2 were envisaged over the 2009-20 period, 70-75 percent through public investments and the remainder through farmers' contributions. Each Pillar 2 project<sup>3</sup> would target associations or cooperatives of small farmers located in marginal areas, usually financing: (i) reconversion from existing crops to other crops characterized by a higher value added (typically from cereal to olive trees); (ii) intensification, aiming to increase the productivity of existing crops; and (iii) diversification, including investments in emerging agri-food chains. An important element in the implementation of Pillar 2 projects includes a contract farming model "l'agrégation", with contracts developed between farmers' groups, investors/traders (aggregators) and the Government. The purpose of this model is to help overcome existing land constraints, promote farmer organizations, support risk sharing, optimize production and marketing links, and enable producers' access to finance, knowledge, and technologies.

5. **The PMV included some institutional reforms.** ADA (the Agricultural Development Agency), was created in 2009, with overall responsibility for managing implementation of the PMV. Institutional reforms included de-concentration of responsibilities to regions, creation of DRAs (Regional Agricultural Directorates) to help coordinate activities between DPAs (Provincial Agricultural Directorates) and the MAPM (Ministry of Agriculture and Maritime Fishery), and support for participatory provincial planning processes.

6. **Recognizing the climate risks facing the country, the Moroccan government sought to mainstream improved climate resilience into the PMV.** The aim of the Project for Integrating Climate Change into the Implementation of the Plan Maroc Vert (PICCPMV) was to facilitate this objective for small farmers through building capacity and knowledge for longer term adaptation while piloting adaptation interventions "to scale" on fields where farmers were already participating in PMV projects. The project was preceded by substantive country dialogue and analytical work addressing both climate challenges and broader PMV goals.<sup>4</sup> It was financed through a GEF grant under the SCCF (Strategic Climate Change Fund) window.

7. **The Bank also supported implementation of the broader PMV through a programmatic series of Development Policy Loans (DPLs),** implemented from 2010 to 2014 for a total of US\$408 million, which aimed at improving: (i) the efficiency of domestic markets; (ii) the socio-economic impacts of Pillar 2 projects targeted at small farmers; (iii) agricultural services; and (iv) irrigation and water resource management. The PICCPMV provided synergy with the DPL series particularly under the second component, where preparatory work included strengthening the manual for prioritization of Pillar 2 projects by including a climate change perspective, and the third component, by including climate adaptation in agriculture in training for agricultural services staff. The evaluation of the PICCPMV is thus closely linked to the impacts of the Development Policy Lending (DPL) series, as well as to progress of the broader PMV. Other recent Bank projects in support of climate resilience and the PMV include the Modernization of

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<sup>3</sup> See Annex 8 of the PAD for further details on Pillar 2 projects.

<sup>4</sup> Agricultural Sector Review 2009, report on "Agriculture and Climate Change: Impacts and Policy Implications"; and "Impact of Climate Change on Water Resources".

Irrigated Agriculture in the Oum Er Rbia Basin Project (2010), the GEF Social and Integrated Agriculture Project (2013), and the Large Scale Irrigation Modernization Project (2015).

## **1.2 Original Global Environment Objectives (GEO) and Key Indicators**

8. The objectives of the project were to strengthen the capacity of public and private institutions and of farmers to integrate climate change adaptations in projects directed to small farmers in the project area.<sup>5</sup>

### **Key indicators included:**

- (i) Percent of Pillar 2 projects in the five target regions integrating at least one climate change adaptation;
- (ii) Percent of small farmers in the selected Pillar 2 projects integrating at least one climate change adaptation.

## **1.3 Revised GEO (*as approved by original approving authority*) and Key Indicators, and reasons/justification**

GEO and key indicators were not changed.

## **1.4 Main Beneficiaries**

9. There were five broad groups of beneficiaries: (a) staff of public institutions involved in Pillar 2 projects, from the Ministry of Agriculture and Maritime Fishery (MAPM) and the regional and provincial directorates of the five target regions; the Agency for Agricultural Development (ADA); the Pillar 2 Resource Center (CRPII); (b) private organizations, including the regional chambers of agriculture, the Professional Agricultural Organizations, investors, traders, entrepreneurs and service providers<sup>6</sup>; (c) the small farmers who were direct beneficiaries of the ten PICCPMV sub-projects<sup>7</sup>(expected to be about 3,000 in number); (d) the farmers who would benefit from project inputs, training and awareness activities (also about 3,000); and (e) indirect beneficiaries, the broader group of farmers participating in the PMV projects which were selected using improved criteria of selection which incorporated climate change adaptation measures. Beneficiaries of the PICCPMV sub-projects were selected through a screening process of Pillar 2 PMV projects, including targeting regions with particular climate vulnerability and agricultural potential characteristics (see section below).

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<sup>5</sup> Five target regions were selected. These were: Gharb-Chrarda-Beni Hssen; Tabat-Sale-Zemmour-Zaer; Chaouia-Ouarghna; Dukkala-Abda and Tadla-Asilal.

<sup>6</sup> The roles of each in the Pillar 2 project cycle are detailed in Annex 2 of the PAD.

<sup>7</sup> All PICCPMV projects are sub-projects of Pillar 2 projects, so project beneficiaries also benefit from these larger programs.

## 1.5 Original Components

10. The project as approved consisted of two components, with total GEF funding of US\$4.35 million. Parallel financing by the Moroccan government was estimated at appraisal at US\$ 26.95 million<sup>8</sup>, supporting operating and staff costs as well as associated financing of sub-projects. The project financed goods, services and small-scale works.

### **Component 1: Development of the capacities of public and private institutions to integrate climate change adaptations in projects directed to small farmers in five target regions. (Indicative budget allocation: 12 percent of the grant).**

11. Component 1 aimed to develop the capacities of selected staff of public and private institutions involved in the planning and implementation of Pillar 2 Projects for integrating climate change adaptations in projects directed to small farmers. As a result, Component 1 would allow the PICCPMV to influence the screening mechanism of projects directed to small farmers (Pillar 2 Projects) in a climate change adaptation perspective. The ADA would be the implementing entity for this Component.

12. This Component comprised two sub-components. Activities of sub-component 1.1 would be to: (i) provide training sessions and carry out workshops and field visits; (ii) produce dissemination materials; and (iii) launch awareness campaigns. The activity of sub-component 1.2 would be to provide training sessions to selected staff of the implementing entities. The budget would cover all above mentioned activities. In addition, under sub-component 1.2, the budget would be used to cover the incremental operating costs incurred by the ADA.

13. Beneficiaries of Component 1 would be the selected staff of institutions such as: MAPM (including the DRAs, the DPAs, and the Directorate for the development of the agri-food chains); the ADA; the regional chambers of agriculture; the CRPII (Pillar 2 Resources Center); the OPAs (Professional Agricultural Organizations); private investors, traders, entrepreneurs, and service providers.

### **Component 2: Dissemination of climate change adaptations among small farmers in five target regions. (Indicative budget allocation: 88 percent of the grant).**

14. Component 2 aimed to disseminate climate change adaptations among selected small farmers in the five target regions. For each PICCPMV sub-project, farmers would benefit from goods, small-scale civil works, and services for the implementation of the climate change adaptations, training, and awareness activities. The MAPM would be the implementing entity for this component, through the DRAs of the five target regions, and with the assistance of the ADA.

15. This Component would include about ten PICCPMV sub-projects. Activities of each sub-project would be to: (i) implement climate change adaptations through the provision of goods, small-scale civil works, and services; (ii) provide training sessions and carry out workshops and field visits; and (iii) carry out the Monitoring and Evaluation (M&E). The budget would cover all the above mentioned activities. In addition, the budget under this component will be used to cover the incremental operating costs incurred by the DRAs.

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<sup>8</sup> This financing was for the broader PMV projects with which the PICCPMV sub-projects were associated and investments were not subject to Bank fiduciary requirements.

16. Beneficiaries of Component 2 would include farmers benefitting from goods, small-scale civil works, and services for the implementation of the climate change adaptations, training, and/or awareness activities. These farmers would be also beneficiaries of a Pillar 2 Project.

17. ADA was responsible for implementation of component 1 as well as for overall coordination and reporting. The Ministry of Agriculture and Maritime Fishery (MAPM) was the implementing entity for component 2, through the DRAs (Regional Agricultural Directorates) of the five target regions, and the Provincial Agricultural departments (MPAs), with overall coordination and technical support provided by ADA.

## **1.6 Revised Components**

The Components were not revised.

## **1.7 Other significant changes**

18. There was a level 2 restructuring in October 2014 which increased financing to Component 1 and reduced financing to Component 2 (see section 2.2).

## **2. Key Factors Affecting Implementation and Outcomes**

### **2.1 Project Preparation, Design and Quality at Entry**

19. **Preparation was closely linked with analytical work undertaken on climate risks, on preparatory work for the PMV DPL series, and with broader country dialogue on agriculture.** The Moroccan government had primary responsibility for preparation, and established a Steering Committee to help increase participation in project design, which included representatives of MAPM, Ministry of Environment and Forestry, Ministry of Economic and General Affairs, Ministry of Mines, Energy, Water and Environment, and the National Institute for Agronomic Research (INRA).

20. ADA (the Agency for Agricultural Development) coordinated preparation, which included preparation of two key reports:

- (a) a technical background report identifying the target regions, prioritizing agri-food chains, linking climate change adaptation measures and identifying the first five sub-projects;
- (b) a draft project implementation manual, describing implementation, financial management, procurement, disbursement, M&E and reporting arrangements for the project, including standard bidding documents.

21. The first document allowed for the identification of the climate change adaptation measures to be implemented under the PICCPMV. The measures chosen focused on drought resistant farm and livestock systems and included two broad groups: (a) introduction of direct seeding and other improved agricultural practices for annual crops, including cereals, lentils and fodder production, and (b) transition from cereals/mixed farm systems to drought-resistant tree crops such as olives, almonds, and figs, coupled with soil/water conservation investments and improved agricultural practices. The measures selected were consistent with internationally established good practice for climate smart agriculture and had already been tested in Morocco.<sup>9</sup>

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<sup>9</sup> See FAO Climate Smart Agriculture Sourcebook 2013. The term “climate smart agriculture” refers to agriculture which is both resilient to climate variability and change (adaptation), and which minimizes GHG (greenhouse gas) emissions (mitigation).

22. **The preparatory documents highlighted the importance of flexibility during implementation, because of the innovative nature of the PICCPMV activities.** The documents also included a detailed analysis of regional and sub-project prioritization, as well as targeted agri-food chains adaptation measures. These included (i) improved crops and varieties, and certified seeds; (ii) direct seeding; (iii) change in seeding dates and/or seeding density; (iv) supplemental irrigation; (v) rainwater harvesting; and (vi) good agronomic practices. The basic principles behind targeting included vulnerability to climate change on the one hand, and potential or adaptation measures to increase productivity/economic value on the other.

23. At appraisal, five sub-projects had been identified, while the other five were to be identified during the first year of implementation. The PICCPMV sub-projects were included into larger Government-funded Pillar 2 projects focusing on specific agri-food chains in the five target regions, and targeted a subset of the farmers benefiting from the Pillar 2 project. The PMV usually implements projects through the Provincial Agricultural Directorates (there are a total of 62), while the PICCPMV sub-projects were implemented through the Regional Agricultural Directorates (there are a total of 12), in order to simplify implementation arrangements. There are five DRAs but the sub-projects take place in ten provinces.<sup>10</sup>

### **Lessons Learned**

24. Lessons taken into account included:

- (a) Given the financial constraints and risk-averse approach of most small farmers-- in Morocco as in many other countries— only climate change adaptation measures that had already been tested in Morocco were selected for the project. The GEF SCCF (Strategic Climate Change Fund) principles also highlighted the importance of selecting measures for which sufficient information was available;
- (b) Given that a critical mass of financing is necessary to engage implementing agencies, the decision was taken to focus project financing only on five target regions rather than more broadly, involving only ADA and five DRAs (under MAPM) in implementation.

25. **The PAD recognized the importance of strong ownership on the part of both the Government and farmers.** The project is part of the broader government program, the PMV, and farmer participation and farmer “ownership” of adaptation measures are recognized as being key to implementation.

26. **Risk analysis: The PAD highlighted two main risks to implementation:**

- (a) Limited capacity in knowledge transfer of climate adaptation approaches, linked also to lack of confidence and awareness by farmers to longer term climate risks and unwillingness to adopt new approaches. Mitigating measures included integration with the agricultural

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Climate resilient measures include sustainable land management and conservation tillage, water conservation and integrated watershed management, integrated crop/agriculture/livestock systems and a change to more drought/flood resilient farm systems and crop mixes. Mitigation measures include conserving and sequestering soil carbon (a key ingredient of soil fertility), minimizing fossil-fuel energy use in farming and water pumping, and managing/re-using emissions from livestock. The ideal is for climate smart agriculture to lead to a “triple win” of improved yields, resilience, and reduced GHG emissions. For Morocco the priority was appropriately on resilience (adaptation); minimum tillage with direct seeding achieves both adaptation and mitigation objectives.

<sup>10</sup> The GEF Morocco Social and Integrated Agriculture Project, approved in March 2013, which aims to increase the implementation of land and biodiversity conservation measures in selected projects directed to small farmers located in targeted marginal areas in the project area, through support to eight sub-projects, is implemented through provincial directorates and is making slow progress, in large part because of disbursement and related procedural challenges.

services component of the DPL, coordination with other development partners on ‘soft skills’ activities, training, use of participatory approaches and knowledge sharing;

- (b) The fact that ADA and the DRAs<sup>11</sup> were newly created agencies and lacked familiarity with Bank procurement and financial management procedures. This risk was mitigated by organizing training sessions. Most staff were familiar also with Moroccan procedures, and many had worked on previous Bank-financed operation.

27. **Although risks were adequately highlighted, the project at appraisal perhaps did not allow enough time for inevitable early implementation delays.** The project was approved in April 2011 (and became effective in October 2011) with a closing date of October 2015. Four years was probably too short for this innovative operation working in five regions, given also the seasonality of many project activities. Five years would have been more realistic; more than 30 percent of grant funds were disbursed in the four month grace period following project closing (see paragraph 28 below). However, the project was small in scale and involved relatively high transaction costs. Lengthening implementation would have increased administrative costs further.

## 2.2 Implementation

28. **Summary:** Implementation moved forward smoothly, though with some delays on component 1. There was a lag between physical implementation, which moved forward quite quickly, and disbursements, which were much slower. Most activities were financed in advance by the Moroccan authorities. There was a mid-term review in October 2013 and a level 2 restructuring was approved in October 2014 which made some minor changes to project design. The project closed in October 2015 as planned with activities completed and outcomes and implementation progress rated satisfactory. The project was not at risk at any time.

29. **The project became effective in October 2011, five months after approval.**<sup>12</sup> The first of the DPL series (see section 1.1 above) was approved in March 2011 and became effective in August 2011.<sup>13</sup> By appraisal, five sub-projects had been selected (under component 2) and two more were in an advanced stage of selection. Physical works had started by fall 2011, with two sub-projects under way and were advancing well by the time the third Implementation Status and Results Report (ISR) was archived in March 2012. Five issues were cited during this first year:

- (i) Activities were initially financed out of government funds, which is standard practice in Morocco, but, there were some delays in reimbursements linked to procedural delays with processing withdrawal applications as the implementing agencies gained familiarity with procedures. The Project had disbursed only US\$0.22m (five percent) by October 2012, compared with appraisal estimates of US\$0.64m by July 2012.<sup>14</sup>
- (ii) The deconcentrated DRAs also had some difficulty in fulfilling Bank requirements for procurement there were a total of 103 contracts for goods and works and 49 contracts for consultants during the full project period so procurement was quite onerous.

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<sup>11</sup> The DRAs were established in all 16 regions in 2009 as part of GoM’s deconcentration program. The ADA was established as the implementing agency of the PMV. They thus comprised very largely existing staff from the MAPM and related agencies.

<sup>12</sup> The PAD data sheet refers to an anticipated effectiveness date of June 15 2011.

<sup>13</sup> Component 2 indicators of the DPL included (a) improving Share of new Pillar 2 projects submitted by Professional Agricultural Organizations, and (b) Share of small farmers benefitting from Pillar 2 support. A key element in PICCPMV preparation was participation in the preparation of the manual for selection criteria of Pillar 2 projects. Component 2 included indicators on improving the effectiveness of the innovation, research and agricultural services systems through increased contracting and private sector participation.

<sup>14</sup> Slow disbursements linked to procedural difficulties remained a problem in the first three years of the project

- (iii) There were early delays in moving forward with the training components, including organization of training sessions; the focus both by the DRAs and by ADA was on launching the agricultural activities under component 2 to coordinate with the agricultural seasons.
  - (iv) There were some concerns with the extent of farmer participation in the sub-projects, which are implemented by service providers though with some farmer contribution. This was the case also for the broader PMV.
  - (v) Although a social and environmental assessment framework was produced, together with assessments for each sub-project, it was not clear how implementation of environmental and social management plans would be monitored.
30. **In the second year physical implementation of both components proceeded, though disbursements continued to lag and totaled only US\$0.36 million by June 2013, a 15-month disbursement lag.** This was in part linked to the agricultural cycle, but partly also to bidding and contracting delays and to the time taken for project staff to gain familiarity with payment procedures.
31. There had been some delays with component 1, linked to challenges in selecting an appropriately qualified organization for knowledge sharing and training.
32. Regarding disbursement delays, a solution was found through use of direct payment procedures, which provided more flexibility vis-a-vis the annual budgeting process and allowed for unblocking three activities under component 1.
33. There continued to be some concerns regarding the extent of public involvement in sub-projects: field visits indicated that farmers knew about them, but were not necessarily clear regarding the detailed timing of implementation. The quality of monitoring environmental management plans remained a concern, especially where these included herbicide application.
34. **A Mid Term Review (MTR) was carried out in October 2013.** Physical implementation continued to meet or exceed most targets (see annual results indicators as summarized in Annex 2) although by November 2013 disbursements totaled only US\$0.58m, a 16-month lag and less than 14 percent of the grant amount. The following agreements were reached at the MTR:
- (i) The PMV implements projects through Provincial Agricultural Directorates (there are a total of 62) while the PICCPMV is implemented through Regional Agricultural Directorates (there are a total of 12), in order to simplify implementation arrangements. Despite some difficulties in coordination, it was decided to keep implementation responsibilities for the PICCPMV at the regional level. There were five DRAs at appraisal<sup>15</sup> but the sub-projects take place in ten provinces.<sup>16</sup>
  - (ii) It was agreed that the resources allocated for physical implementation under component 2 had been over-estimated at appraisal and that more funds should be directed to component 1 for training of MAPM and ADA staff, including on international experience with direct

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<sup>15</sup> There have been some administrative changes since then and at present four DRAs cover the PICCPMV project area

<sup>16</sup> The GEF Morocco Social and Integrated Agriculture Project, approved in March 2013, which aims to increase the implementation of land and biodiversity conservation measures in selected projects directed to small farmers located in targeted marginal areas in the project area, through support to eight sub-projects, is implemented through provincial directorates and is making slow progress, in large part because of disbursement and related procedural challenges.

seeding, for private sector and farmer capacity building.<sup>17</sup> Expanding the number of component 2 projects was discussed as an alternative, but given the time remaining<sup>18</sup>, was not regarded as an option. However it was agreed that increased sharing experience between Pillar 2 projects should be undertaken. It was also agreed that the disbursement category for incremental operating costs was unnecessary, since all these costs were met by the Moroccan authorities. A level 2 restructuring was proposed to make these design changes and adjust the disbursement profile.

35. **A Level 2 Restructuring was processed over the summer of 2014, following some procedural delays on the part of the Government.** By June 2014 disbursements were finally improving, with US\$1.28 million disbursed and a (now diminishing) 14-month disbursement lag. Funds under component 1 were also over-committed. Delays between payments and submission of withdrawal applications and processing by the Ministry of Economy and Finance remained a challenge, but there were marked improvements. The level 2 restructuring was approved in October 2014, the changes made were consistent with the agreements of the MTR and included the following:

- (i) Financial support to component 2 was reduced, from US\$3.79 million to US\$3.05 million.
- (ii) Support to component 1 was increased from US\$0.42m to US\$1.3million, from funds reallocated both from the incremental operating cost categories (estimated at US\$130,000 at approval), which were eliminated and from component 2 (US\$0.75 million).
- (iii) The disbursement categories were revised to take account of the changes, and the disbursement profile was revised to reflect disbursements to date and those planned by project closing.

36. Implementation progress was upgraded from Moderately Satisfactory to Satisfactory in November 2014, with disbursements at 43 percent and consistent with the revised disbursement profile. By April 2015 disbursements had reached 59 percent.

**The October 2015 ISR, archived shortly before the project closed, rated both outcomes and implementation progress satisfactory.** Disbursements were 67 percent but all funds were committed and there was confidence that most payments would be made within the grace period. The project accounts closed on February 15, 2016 with 98 percent of grant funds disbursed<sup>19</sup>. Targets laid down in the results framework were achieved and in many cases exceeded. Physical implementation is summarized in section below.

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

37. **Design— Monitoring indicators were designed to assess progress towards the PDO, which was to strengthen the capacity of public and private institutions and farmers to integrate climate change adaptations in projects directed to small farmers in five target regions.** The first PDO level indicator, *percent of Pillar 2 projects in the target regions integrating at least one climate change adaptation*, was intended to illustrate the extent to which the project met the broader goal of climate change integration in the PMV program in the five regions. The second indicator, *adoption by small farmers in the projects specifically targeted by the GEF project*, was tightly tied to the investments under component 2. Intermediate outcomes 1 and 2

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<sup>17</sup> The MTR could usefully have provided an explanation of why and which costs had been over-estimated for component 2, or why costs under component 1 were under-estimated.

<sup>18</sup> Extension was not considered as an option by the WB group team, given the small size of the operation and the disbursement performance.

<sup>19</sup> The US dollar appreciated by 15% during the implementation period.

*number of staff in public and private institutions trained*, were related to component 1, while intermediate results indicators 3 and 4, *number of farmers in the PICCPMV sub-projects integrating at least one climate adaptation measure*, and *number of farmers in PICCPMV sub-projects benefiting from training*, was related to component 2.

38. **Selecting indicators was challenging.** The difference between the second outcome indicator and the third intermediate outcome indicator is not immediately apparent. It is difficult to establish attribution between the first outcome indicator, *percent of PMV projects including an adaptation measure*, and the training activities supported under the project. Specifically the big jump in achieving this result between the base year and year 1 (see section 3.2 which provides a table on annual progress with indicators) was likely achieved through broader policy dialogue preceding the project, rather than through the interventions themselves. The indicators do not reflect the impact on yields or climate resilience of the measures; however, it must be acknowledged that this would not have been realistic over the life of the project—given annual variations in rainfall (for annual crops) and the time taken for crops to mature (for tree crops). Furthermore, the operation was a small one, which needed to use resources for monitoring and evaluation strategically by identifying a limited number of SMART<sup>20</sup> indicators consistent with those of the broader PMV. Nevertheless there are some issues of definition and causality (see section 3 below) of indicators under component 1.

39. **Implementation—ADA was responsible for monitoring and evaluation for component 1, and for aggregating information from the DRAs on component 2.** ADA produced regular progress reports every six months, and there were also regular progress meetings. Reports also provide qualitative information on a range of issues, including the impact of the training provided (for example the training on direct seeding in China provided insights on appropriate machinery for seeding) and on progress and challenges with the sub-projects. Reports prepared by the National Agronomic Research Institute (INRA) also provide inputs on progress with the sub-projects. The completion report, however, does not provide information on how longer term impacts will be monitored. The fact that climate adaptation is being broadly integrated into the PMV, and that policies are being implemented which provide for mainstreaming adaptation into programs to support small farmers (as well as the commercial sector) suggest there are strong grounds for optimism regarding longer term sustainability. Furthermore, one of the strong points of the M&E approach was that it did not involve a substantial additional administrative burden on staff, and was integrated into the broader PMV monitoring system. It was also consistent with GEF SCCF guidelines.<sup>21</sup>

40. **Utilization -- A possible missed opportunity was to use the project to develop a methodology for monitoring and evaluating longer term impacts of adoption of climate resilient technologies.** Climate resilience can be assessed using a number of approaches. The first, long-term approach is to measure average yield variability against rainfall variation; reduced variability, together with acceptable average yields<sup>22</sup>, is an indicator of improved resilience. This indicator is useful if the crop is not changed; it would be helpful to assess the impact of introduction of direct seeding and improved farm systems for cereal cultivation, for example. Other physical indicators could include those related to soil health and carbon content. Assessing resilience where there is a shift in farm systems, from cereals to tree-crops, would require a different approach. In the short run, tree-crop survival rates could be monitored, together with soil health, but in the

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<sup>20</sup> i.e. specific, measurable, achievable, relevant and time-bound

<sup>21</sup> See “Updated results based Management Framework for Adaptation to Climate Change under the Least Developed Countries Fund and the Special Climate Fund” GEF LDCF/SCCF Council Meeting October 2014 Agenda item 5.

<sup>22</sup> These may be lower than the maximum yield “without” adaptation measures but average yields will be more consistent.

longer run, resilience of incomes as well as physical indicators such as soil health and moisture content could be compared between similar areas which have, and have not, adopted different farming systems. While impact assessments of this kind go beyond the scope of the PICCPMV, one option would have been to include in the project applied research on development of methodologies for impact assessment adapted to the Moroccan context. Regarding utilization of monitoring tools, there was close interaction with farmers during implementation, and approaches were modified to address issues they raised. But this was because of good communications between those responsible for day to day implementation and farmers, rather than because of the M&E tools.

## **2.4 Safeguard and Fiduciary Compliance**

### **2.4.1 Environmental and Social Safeguards**

41. **The project was expected to have substantially positive social and environmental impacts.** The project aimed to reduce the vulnerability of small farmers to climate risks and help manage land and water more sustainably. The project was rated category B. Given the programmatic nature of the project and since not all sub-projects had been identified at appraisal, a framework study of environmental and social impacts was developed. Two policies were triggered: OP4.01 Environmental Assessment and OP 4.09 on pest management where a sub-project included financing for pesticides. The study clarified that no social safeguard policies were triggered. In order to comply with Bank environment safeguard policies Environmental Assessments and Environmental Management Plans needed to be prepared and disclosed for each sub-project before GEF financing for that sub-project could start. Morocco has well developed environmental legislation and regulations, including on pesticide management, which are substantially consistent with Bank policies; and environmental sustainability is increasingly embedded in broader Moroccan development policy.<sup>23</sup>

42. **The Framework Study on Environmental and Social Impacts was disclosed in February 2011 and emphasizes the links between the PICCPMV and the broader PMV.** Sub-project EAs (environmental assessments) and EMPs (environmental management plans) were prepared and disclosed for each sub-project. ADA had overall responsibility for compliance and the DRAs and DPAs were responsible for operational monitoring of implementation. However, the PAD did not provide an institutional capacity assessment of their experience in environmental management.

43. **The main focus during implementation was on safe use of agro-chemicals. The PICCPMV supported development of farm systems and crop varieties that were bred to resist drought and disease, thus minimizing requirements for agro-chemicals.** The four no-till sub-projects, however, required use of phytosanitary products. Following some concerns raised in 2012, INRA was contracted to provide training to project beneficiaries in safe use of agro-chemicals, and reached over 3,400 participants. In June 2015 ADA commissioned an evaluation

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<sup>23</sup> Morocco approved a comprehensive environmental strategy in 2005 of which sustainable management of water and soils were key elements. The Department of Environment has become a full-fledged environmental administration under the Ministry of Water, Energy and Environment. Law No. 12/03 in 2003 defines the requirements for Environmental Impact Assessments (EIAs) and creating a national committee for the review and oversight of EIAs. National and regional EIA committees as well as a decree for public consultation and disclosure. The PICCPMV ECIES provides details on legislation and regulations. The series of DPLs for Green Growth supported by the Bank, (the most recent was approved in December 2015 for US\$ 300m) which form a key part of the CPS, supports implementation of these policies, including sustainable management of natural capital in agriculture and strengthening of the rural economy. Morocco's commitment to environmentally sustainable development has been further strengthened by approval by Parliament of the Framework Law on Environment and Sustainable Development in March 2014 (Law 99-12).

of safeguards implementation under the project. It concluded that service providers had the capacity to implement recommended guidelines, and that the operational policies and procedures of the World Bank triggered were respected during the PICCPMV implementation. However, the report also stated that the Environmental assessment/management plans did not always include sufficient practical tools for those responsible for managing implementation adequately to identify, implement and monitor mitigation measures. The government ICR also emphasizes that PICCPMV facilitated development of a broader regulated market and categorization system for agricultural chemicals in the project regions, including both herbicides and pesticides.

44. **A possible shortfall is that the focus of the Environmental and Social Management Plans (ESMPs) have been largely on pesticide management (OP 4.09)** rather than broader environmental management (OP4.01). During sub-project implementation farmer feedback highlighted the issue of water for supplementary irrigation, especially during the establishment phase, for the olive conversion/intensification programs<sup>24</sup>. This affected the survival rate of seedlings in some areas. In principle, ESMPs prepared as part of sub-project preparation would have identified potential local water resource issues including both groundwater and surface water; in practice this does not always seem to have been the case, and this issue was not raised during implementation support missions.

45. **A second shortfall has been monitoring compliance at implementation.** In principle environmental and social impact monitoring should have been integrated into broader results progress monitoring of both PICCPMV sub-projects and the specific PMV Pillar 2 project of which it formed a part, but the results framework does not include specific indicators for environmental compliance. The PICCPMV PAD does not discuss environmental management measures in the PMV. However the PAD for the DPL in support of the PMV concluded that impacts will be mostly positive. Potential negative effects included, in addition to waste management, increased pressure on scarce water and arable land resources due to accelerated agricultural development. ADA was to undertake an environmental impacts analysis of the entire PMV program in 2012. The Bank PICCPMV ISRs do not refer to the 2012 impacts analysis. The feedback from the specific sub-projects supported by the PICCPMV indicate that groundwater management and access to surface irrigation water remain a substantive issue for small farmers in some Pillar 2 projects. Water management could have received greater focus in environmental management plans.

46. **Bank implementation support for environmental management faced some discontinuities,** linked in part to staff changes.

47. **Because no social safeguards were triggered, a social development specialist was not assigned to the project.** This was a possible shortfall, since there were some broader issues regarding farmer participation on which implementation support would have been useful.

## 2.4.2 Fiduciary Compliance

### Procurement

48. **Morocco has quite strong procurement and financial management legislation and substantial experience with implementing Bank-financed operations, including in the agricultural sector.** Although ADA and the DRA were established only in 2009, many of the staff

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<sup>24</sup> See also Annex 4 Social Assessment of the PICCPMV, and Annex 2 summarizing implementation of the PICCPMV sub-projects.

nominated to these organizations had experience with procurement and financial management. Nonetheless, the staff of ADA and five regional organizations had to become familiar with Bank procedures.

49. **Procurement was quite cumbersome.** The project was designed to have a large number of small contracts; there were 103 contracts for goods and civil works, and 49 consultants' contracts. For total financing of US\$4.35 million, this implies an average contract size of less than US\$30,000. The project thus had quite heavy transaction costs for the Moroccan authorities. An advantage was that contracting at provincial level was consistent with the broader PMV approach; the challenge was that the PICCPMV contracts were generally much smaller than those of the PMV. A post-procurement review was carried out in April 2013 which found that processes for the 32 contracts signed from April 2012 to April 2013 were largely satisfactory. There were also a few instances where only one bidder responded to invitations.

### **Financial management (FM)**

50. FM performance was rated satisfactory until 2013 but the performance was downgraded to Moderately Satisfactory (MS) in the last three ISRs. The MS rating is due to multiple factors:

(a) There was a time lag between the cumulative payments and disbursement due to the involvement of central and local participating entities in the expenditure chain. ADA had to consolidate Statement of Expenditures (SOEs) at the central and local levels from the DRAs and process them for approval by the Ministry of Agriculture and Fisheries (MAPM), the Ministry of Economy and Finance (MEF) and the Bank's disbursement department. The establishment of a system of communication between these entities through the appointment of focal points at the level of DRAs, and use of group mailing list helped in reducing these delays. Meanwhile, The TF did not fully disburse at closing date. It disbursed US\$1.2 million during the grace period, or 28 percent of the total grant. Project restructuring also took time because of the need to discuss the reallocation in budget and activities with the different DRAs and the beneficiaries, as well as with the MAPM and the MOF.

(b) Duality in auditing by the IGF and the private auditor contracted for the project duration was discussed with the IGF, the ADA, and the Task Team Leader (TTL). ADA preferred to recruit an external auditor as allowed in the Procurement Plan. The IGF conducted its own missions although the Bank clarified that arrangements had been made by the Project Implementation Unit (PIU) to recruit an external auditor. This issue may highlight a broader question: the tension between Bank auditing requirements and country systems, which in the case of Morocco are well established.

51. **Budget planning also presented some difficulties** as the implementing agencies gained familiarity with budget procedures. ADA was able to provide for more flexibility by opening empty budget lines in the budget law, which could be filled should the need arise during the year of implementation. The Moroccan authorities were proactive in seeking solutions. Recommendations were made, for example, to share procedural solutions between DRAs (DRA Rabat, for example had prepared a detailed procedures manual). Project accounts closed in February 2016 with the grant 98 percent disbursed.

52. **There were no issues with regard to compliance.** Furthermore ADA and DRA staff used the opportunity to become familiar with Bank procedures, which will facilitate implementation of Bank and other development partner financed operations in the future. A broader question remains as to whether the procurement arrangements could have been designed at entry to be simpler—for example by supporting community contracting for greater farmer participation, or reducing the

number of contracts<sup>25</sup>. One option, for example, might have been to group procurement of certain materials and equipment, such as seeders or herbicides, into fewer, larger contracts. The PICCPMV used the same arrangements as the broader PMV program, with activities in different provinces intended to benefit farmers contracted to service providers; the challenge was that individual contracts for the PICCPMV were much smaller than for the broader PMV programs.

## **2.5 Post-completion Operation/Next Phase**

53. **The PICCPMV sub-projects form part of broader PMV Pillar 2 investments.** These take place on farmers' land, with their participation and agreement and including farmer training on improved climate resilient technologies. The success and likely scaling up of the PICCPMV investments is closely linked to the success of implementation of the PMV itself, which continues until 2020. The recent Implementation Completion and Results Report (January 2015) of the DPL series to support the PMV concludes that progress has been good overall, especially in areas of relevance to the PICCPMV such as increased farmer participation in Pillar 2 projects, and improvements in agricultural services. This success increases the chances that the improvements supported by the PICCPMV will be sustained, as does the experience gained with different climate smart technologies and the training activities of the PICCPMV itself. A mid-term review of the PMV has recently been completed which is still undergoing Ministerial review. At this stage, introduction of measures to monitor longer term impacts of the program, including climate resilient agricultural interventions (see section 2.3 above) would be helpful. ADA has established a register of farmers supported by the PMV and the PICCPMV which will help with impact monitoring.

54. **Morocco is committed more broadly to green growth and “climate smart” development.** The Bank is supporting its Inclusive Green Growth agenda through a series of DPLs to support green growth. The latest, approved in 2015, includes a number of measures to strengthen the management of natural capital, support dissemination of green technologies in agriculture—first and foremost direct seeding—and strengthen agro-meteorological services. The PICCPMV has played a role in piloting both green technologies and improved management of natural capital.

## **3. Assessment of Outcomes**

### **3.1 Relevance of Objectives (Rating: High), Design and Implementation (Rating: Substantial)**

55. The PICCPMV was highly relevant at appraisal and remains relevant moving forward. Moroccan country priorities are to support strengthened governance and institutions, accelerate and sustain economic growth, and address social and economic inclusion. The 2014-17 Country Partnership Framework (Report 86518-MA) builds on the 2010-13 Strategy (Report 50316-MA) to support government goals through three pillars: promoting competitiveness and economic growth; building a green and resilient future; and strengthening governance and institutions for improved service. The PICCPMV, and the linked DPL in support of the PMV and new series of green growth DPLs, support all three pillars. A particular strength of the PICCPMV has been its integration with a broader government and World Bank-supported program. Experience from the PICCPMV should inform wider scale adoption of climate resilient agriculture in the broader PMV and future programs. The operation made a substantial difference to institutional capacity and ownership for integrating climate change adaptation into the agricultural sector in Morocco; it is a practical example of the “theory of change” at work.

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<sup>25</sup> For some sub-projects local administrations mediated with service providers to increase use of local labor in field activities.

### 3.2 Achievement of Global Environmental Objectives (Rating: Satisfactory)

56. **Intermediate outcomes under component 1:** ADA organized the following awareness raising and training activities to the benefit of staff of a total of 264 public and 197 private institutions:

- Study tour on no-till to China for representatives from the Ministry of Agriculture at central and local level, farmers, and producers of agricultural machineries.
- Information campaign on climate change through various audio and written media.
- Diffusion of radio spots on climate change and the PICCPMV.
- Study on no-till addressing environmental and social aspects.
- Workshop (in Settat) to raise awareness about no-till.
- Training for MAPM and ADA managers on climate change adaptation (in the Netherlands).
- Training on no-till for farmers and MAPM managers (in China).
- Training for MAPM and ADA managers on climate change negotiation.

57. Feedback from participants suggests that the in-country training on direct seeding was especially effective, in part because of its broader outreach. And the training in China provided insights into options for more cost-effective direct seeders and their utilization.

58. **Intermediate outcomes under component 2:** ten sub-projects were implemented<sup>26</sup>: Annex 2 provides further details, including a location map and the larger PMV project of which the PICCPMV sub-project forms a part. All projects worked through existing farmers groups. **The technologies supported by the sub-projects can be divided broadly into two groups:** (i) four sub-projects supporting the introduction of direct seeding and other improved agricultural practices for annual crops, including cereals, lentils and fodder, for which project support totaled MAD 19.9 million; and (ii) six sub-projects supporting transition from cereal/mixed farm systems to drought-resistant tree-crops (olives, figs, almonds), coupled with soil/water conservation investments and improved agricultural practices, for which project support totaled MAD 14.9 million. With sub-projects in five DRAs covering 10 provinces, and with different technologies, progress reporting was inevitably not entirely consistent between sub-projects.<sup>27</sup> All sub-project investments were accompanied by training programs:

- (i) Almond tree improvement and value chain development (Azilal, DRA Tadla Azilal).
- (ii) Expansion and value chain development for olives (Gharb-Chrarda-Beni Hssen, DRA Beni Mellal).
- (iii) Conversion from cereals to olive tree cultivation (Beht, Khemisset, DRA Rabat Salé Zemmour Zaer).
- (iv) Conversion from cereals to olive tree cultivation (Khouribga, DRA Chaouia Ouardigha).
- (v) Extension and intensification of olive trees (DRA Doukkala Abda).
- (vi) Extension and value chain development for fig tree production (DRA Doukkala Abda).
- (vii) Intensification of cereal production (soft wheat) (Rommani, DRA Rabat Salé Zemmour Zaer).
- (viii) Intensification of cereal production (soft wheat) (Sidi Yahia Zaer, DRA Rabat Salé Zemmour Zaer).

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<sup>26</sup> Costs are based on those provided in the Government Completion report dated October 2015. Numbers of beneficiaries are challenging to present in summary, since different measures supported different numbers of farmers within a sub-project.

<sup>27</sup> Some reports may group two projects within a province as one project, and in others training may have been shared between two sub-projects.

- (ix) Improved fodder production for dairy cattle (Benslimane, DRA Chaouia Ouardigha).
- (x) Cereal intensification using direct seeding (Settat, DRA Chaouia Ouardigha).

59. **The project provided an opportunity to pilot new adaptation technologies to scale, and to learn from experience.** Direct seeding required use of herbicides, and acquisition of expensive direct seeding equipment, which was perceived as a constraint to wide adoption by some farmers. INRA has developed methods of cultivation requiring less herbicide, while new Government subsidy policies (supported by the Bank through the latest series of DPLs in support of Inclusive Green Growth) now support purchase of these seeders as well as rental program. The approach is already being scaled up. Cultivation of drought and stress-resistant triticale as a replacement for the more water demanding maize has been a welcome innovation for livestock farmers. It is too early yet to assess the success of longer term programs such as conversion of cereal land to tree-crops. One challenge is that many of the farmers, especially those focusing more on subsistence than commercial agriculture, use tree-crop land also for rain-fed cereals and livestock grazing. Difficulties with the transition to farm systems focusing on higher yielding tree-crops have included poor maintenance of soil-water conservation structures and resistance on the part of more traditional farmers to improved agricultural practices. Some farmers also highlighted difficulties with access to water for supplementary irrigation of young trees.

60. **The introduction of these new technologies faced some implementation difficulties.** These included: (i) for the cereal crops, the availability of direct seeders and herbicides; (ii) for the tree-crops conversion, in addition to farmer skepticism and water constraints, availability of improved varieties in sufficient quantity. For both groups there were also some challenges with the “contracted service provider approach”, which the local administration sought to overcome. For the tree crops group of projects it was in some cases difficult to differentiate PICCPMV interventions from those of the broader PMV project, in part because the PMV project itself supported climate smart interventions.

61. **The project largely achieved its intended outcomes, as summarized in Table 1 Annex 2.** The aim of the project was to strengthen the capacity of public and private institutions and of farmers to integrate climate change adaptations in projects directed at small farmers in the target regions. A strong feature of the project was that intermediate outcomes were monitored regularly from project start so progress could be assessed on an annual basis.

62. **Component 1: The outcome indicator on integration of climate change adaptation measures into Pillar 2 projects was exceeded,** with 45 percent of Pillar 2 projects in the five target regions (51 out of 111) integrating at least one measure, compared with an end-target of 35 percent.<sup>28</sup> The baseline of zero compared with the achievement of 30 percent in year 1, before project expenditures had taken off, requires, however, explanation. Intensive dialogue with ADA on integrating climate risks into the broader program supported by PMV resulted in climate vulnerability being one of the key criteria for selection of the PMV projects. This was articulated in the PMV operational manual. This explains the jump in integration number at the start of the project. It illustrates again that the PICCPMV project cannot be reviewed separately from the broader PMV program.

63. **For Component 2 the final target was achieved and largely exceeded.** 9,891 farmers in the targeted Pillar 2 projects (43 percent against the target of 35 percent) integrating at least one

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<sup>28</sup> The break down by region is the following: Chaouia-Ouardigha: 7 out of 21 (33%), Rabat-Sale-Zemour-Zaer: 5 out of 18 (28%) Gharb-Chrarda-Beni Hssen: 1 out of 11 (9%); Tadla-Asilal: 17 out of 36 (47%) Doukalla-Abda: 21 out of 25 (84%).

Climate Change (CC) adaptation measure, out of a total of 22,880 farmers targeted in the Pillar 2 projects). This result demonstrates the improved capacity of private entities (farmers and farmers associations) to implement CC adaptation measures: the GEF grant financed the CC adaptation measures for 2,423 small farmers, while the remaining 7,468 actively engaged to implement the measures once observed the good results achieved by the farmers targeted by the GEF grant.

64. **There are, however, some questions about causality links, especially for component 1.** For component 1 the jump from zero to 30 percent of PMV projects in the five target regions integrating at least one climate change adaptation measure is explained by the inclusion of adaptation criteria in the PMV Pillar 2 project selection. This policy change happened at the start of the project, not as a result of the staff or public or private institutions trained (or adaptation measures piloted under component 2) during project implementation. This in turn begs the question of whether policy change should have been included in the key indicators. The implementation support reports do not, for the most part, discuss the broader domain of PMV projects in the target regions. They focus on progress with project specific outputs including training and the adaptation measures of the 10 sub-projects, while discussing briefly also progress with the PMV project to which the sub-project is attached. While the numbers of farmers benefiting from interventions under the sub-projects, as well as from training initiatives, is monitored, the methodology for measuring the total number of farmers in the ten Pillar 2 projects who adopted adaptation measures (intermediate outcome 2) could have been described more clearly. A mid-term review of PMV has been prepared by the Government and is in a draft.

65. **There was an attempt to introduce core indicators developed by the Bank into the results framework after 2012 for corporate monitoring purposes.** The ISR archived in June 2014 introduces as new core indicators the number of beneficiaries (including percent women), and as intermediate outcome indicators the number of clients who have adopted a new technology (including percent women). This was done for corporate monitoring purposes, , but was not reflected in the modification of the Results Framework at restructuring nor consistently informed in the ISRs.

### 3.3 Efficiency (Rating Substantial)

66. **Rates of return are not generally calculated for operations of this kind.** About half of the project costs were used for training and capacity building, both for farmers and for public and private sector beneficiaries. The objectives of the project were framed in terms on capacity building, not productivity increases. This was appropriate; the benefits in terms of more drought resilient yields as a result of the technical interventions can only be measured over a longer time-frame than the project investment period. Furthermore, since in many of the sub-projects new technologies were being piloted, the unit costs would likely be higher than when these technologies are well understood and applied to scale.

67. **While there are two broad groups of technical interventions, sub-projects within each group do not all support comprehensive package of climate resilient approaches, and the number of sub-projects within each group is small.** Annex 2 provides information on the costs of interventions.<sup>29</sup> Costs averaged US\$136 per hectare and per year or US\$273 per farmer and per year for the cereal to tree crop conversion sub-projects, and US\$294 per ha and per year and US\$932 per farmer and per year for the direct seeding sub-projects. Averaged across all sub-projects, costs reached US\$205 per ha and per year and US\$488 per farmer and per year (this is to

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<sup>29</sup> When differences in the estimates of beneficiaries/ hectares emerged between different sources, data from the Government's ICR was chosen.

be compared with estimated costs at appraisal of US\$310/ha/year and US\$344/farmer/year). Training costs averaged US\$50 per farmer for all sub-projects. The fact that actual costs were lower during project implementation than estimated at appraisal is a testimony to the project's overall efficiency. However, these numbers should be considered with caution. It was not possible at the level of this ICR to come up with useful cross country comparisons, given differences in geographical, policy and farm systems characteristics. As mentioned above, it would have been useful for the project to have included an activity to develop a longer term methodology for assessment of cost effectiveness of climate smart agriculture interventions.

68. **More broadly, the approach to project design was highly cost-effective, since it sought to integrate with and influence a much larger government program and policy shift for agricultural development.** Specifically, it influenced broader PMV and country policy regarding the importance of climate resilience in agriculture. Government has upscaled the adaptation component of the PMV program, and in recognition of the importance of helping farmers with the transition costs to direct seeding systems, has implemented a policy of subsidizing the purchase of direct seeders.<sup>30</sup> The simplicity of design, with only two components, and supporting introduction of only two new technologies, was another factor in its efficiency; and it was not over-ambitious in scope. While operationally the project posed heavy transaction costs to meet World Bank fiduciary requirements, it had no dedicated PIU and used existing administrative structures for implementation. This approach facilitated mainstreaming and sustainability after the PICCPMV intervention ended, in addition of not requiring incremental operating costs. The project also had substantial broader institutional impact; in part because of the experience that ADA gained in PICCPMV management it was accredited as an implementing agency of the Climate Adaptation Fund and has recently received an initial grant of US\$ 10 million from this fund.

### 3.4 Justification of Overall Outcome Rating

Rating: Satisfactory

69. **The overall rating is judged to be Satisfactory.** The project was and remains highly relevant regarding Bank and government country strategy, and there is strong country ownership. It largely achieved its objectives, although there are some questions regarding causality and attribution. Cost-effectiveness is not usually assessed for GEF grant operations of this kind which pilot new approaches, but given the contribution that the operation has made to integrating climate-resilient agriculture into the broader government PMV, it can be judged to be cost-effective. It would be desirable, however, to develop a methodology for monitoring and assessing the longer term impact and cost-effectiveness of scaling up climate resilient, and broader climate smart, agricultural interventions.

### 3.5 Overarching Themes, Other Outcomes and Impacts

#### (a) Poverty Impacts, Gender Aspects, and Social Development

70. **The project was as poverty-focused as the overall Pillar 2 program.** All Pillar 2 projects of the PMV targeted smallholders dependent largely on rainfed farming, the rural population has higher poverty incidence than the urban, and these smallholder farmers constitute the poorer segments of the farming community. Nevertheless, since the participating farmers are already members of cooperatives/associations, they are likely to be relatively more entrepreneurial than

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<sup>30</sup> The Bank-supported DPL in support of Green Growth has supported this policy shift.

the poorest farmers.<sup>31</sup> Furthermore, as indicated in Annex 2, interventions tended to be more successful for the commercially-oriented small farmers, especially regarding the cereals to tree-crops conversion program. Farmers who are ready to adopt new technologies tend to be “first movers” and in follow up phases, more traditional farmers follow.

**71. The number of females was very small (less than five percent) but there are reasons for this.** In the specific agri-food chains which were the focus of the PICCPMV (olive and fruit trees, cereals, forage crops) the man is usually the main counterpart within the household, except as regards almond processing. This is understandable considering also the technology involved (i.e. use of tractors) and the way workload is shared within the household. Women predominate in other agri-food chains (e.g. argan, cactus, small animals). Women benefited from the interventions to the extent that the household benefited.

**72. More broadly the PMV supports increased farmer participation in decision making and the PICCPMV was part of that process.** The ICR of the DPL series in support of implementation of the PMV notes that the share of PMV projects submitted by farmers’ associations increased from 40 percent to 84 percent over the project period, and refers to PICCPMV in this context. The PICCPMV did not include any specific social assessments during preparation.

#### **(b) Institutional Change/Strengthening**

73. A key aim of the project was to strengthen the capacity of public and private sector institutions (and farmers) to integrate climate adaptation in projects directed to small farmers in the target regions. It is still too early to judge definitively the impact on the MAPM and its regional and provincial institutions, private sector actors, INRA and related bodies of the operation, but given the broader PMV, the prospects are favorable. The DPL ICR also reports success in strengthening of the Moroccan agricultural research system, of which INRA forms a key part.

74. Concerning ADA, the PICCPMV accompanied the strengthening of the institution in climate change adaptation. ADA was created shortly before the preparation of the PICCPMV, and thus had little experience in the domain; however during project implementation, its staff acquired targeted skills which were able to be mainstreamed in the implementation of the Pillar 2 projects. A dedicated environment unit was created.

#### **(c) Other Unintended Outcomes and Impacts**

75. Benefits of the PICCPMV went beyond the project. The project was showcased at the 18th session of the Conference of the Parties (COP18) of the United Nations Framework Convention on Climate Change (UNFCCC) in Doha. The experience with direct seeding helped MAPM identify the main bottleneck for adoption - the high cost of the seeding machine. As a result, the MAPM has included a subsidy for purchase of this machine, an action supported by the World Bank as part of the Inclusive Green Growth Development Policy Loan, which includes measures for improved water and climate change management. The program also facilitated improved synergy between development partners, and built capacity at regional MAPM level to manage

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<sup>31</sup> This observation is also made by the Beneficiary Assessment (see Annex4)

development partner procurement and financial management requirements. Finally, ADA was accredited as an implementing agency of the Climate Adaptation Fund and has recently received an initial grant of US\$10 million from this fund. ADA has also been accredited as an implementing agency of the Green Climate Fund.

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

76. **A beneficiary assessment was undertaken by the Bank team as part of the ICR mission.** Workshops and farmer consultations took place in each sub-project area (see Annex 2 and 5). Overall, the results confirm that while most farmers feel positive about the project, the benefits have been clearer for the direct seeding activities, while mixed for the activities concerning improved tree-crop cultivation or conversion of cereals to tree-crops. The difficulties have concerned partly conservative attitudes, which take time to change, but also, for the more subsistence oriented farmers, concerns of the transition costs from mixed systems comprising extensive tree crop, cereal and livestock systems to more intensive systems focusing on tree crops. This has been the case even when the intervention has allowed for inter-row cropping with cereals. There have also been concerns that more intensive farming might require greater use of cash inputs, where access to finance is limited especially for farmers who lack formal title.

77. **Farmers also emphasized the importance of improved value chains, but also for modernization in farm management skills, especially for young people.** The need for better schooling was highlighted, as well as for higher level training programs teaching computer and more modern farm management and commercialization. Some farmers thought it unlikely that their own children would remain in agriculture.

78. **The survey confirms the contribution of the PICCPMV to the broader PMV agenda,** but highlights the importance of broader rural development, sector modernization, education and economic diversification.

## **4. Assessment of Risk to Development Outcome**

Rating: Moderate

79. **The operation had and has strong government ownership,** and forms part of the Moroccan authorities' broader program for agricultural development, climate change adaptation, growth, and poverty reduction. Project actions are mainstreamed into core government institutions and financing mechanisms and are not project –dependent. Government is committed to scaling up its support to climate responsible development, and the Bank is supporting this through the latest series of Green Growth DPLs as well as the renewable energy program. Moreover, the rating is justified by: (i) capacity building objectives, which succeeded since climate resilience was scaled up and (ii) technical interventions themselves provided opportunities for learning.

## **5. Assessment of Bank and Borrower Performance**

### **5.1 Bank**

#### **(a) Bank Performance in Ensuring Quality at Entry**

Rating: Moderately Satisfactory

80. **The project was preceded by policy dialogue and analytical work, and there was strong government ownership.** Selection criteria for sub-projects were clearly established, with the participation of core Moroccan research institutes and the MAPM, and five of the planned ten sub-projects were identified and prepared by appraisal. Implementation arrangements were clear,

and provision made for strengthening fiduciary management through capacity building. These were all strengths.

81. **One area was missing in the background section of the PAD: information on the quality of agro-meteorological services.** Availability of downscaled information on weather and climate, adapted to local farmers' requirements and disseminated promptly with relevant advice, plays a key role in climate-smart agriculture. The PAD could usefully have included a brief assessment of agro-meteorological services, of ongoing work to improve them in Morocco, and of opportunities for coordination between the PICCPMV and PMV implementing agencies and the Moroccan hydro-meteorological service. An explanation of why it was not necessary to address this area could have been provided in the PAD.

82. **A second missing area was an assessment of the strengths and weaknesses of water resources and groundwater management, and inter-ministerial coordination on this issue.** Since the issue of water access and sustainability was a concern in implementation of a number of the PICCPMV projects, and since the Bank was already supporting water resource management through the DPL and related investments, this area could have received further attention.

83. **There were a number of other areas for improvement.** The Bank could have clarified in more detail with ADA the training and capacity building of public and private institutions required; component 1 got off to a late start as a result. There could have been greater clarity as to the definition of broader capacity building in the results framework (see section 3.2 above), as well as to links of component 1 activities with the first outcome indicator. And the cost sharing of the sub-projects between Government and the PICCPMV, estimated at appraisal, could have been confirmed and quantified during implementation. Options for a more simple approach to procurement could have been explored, to reduce the number of contracts and/or to support community contracting and greater farmer participation.

#### **(b) Quality of Supervision**

(including of fiduciary and safeguards policies)

Rating: Satisfactory

84. **A total of nine implementation support missions were carried out.** The project benefited from stability in task team leadership during implementation, and sustained implementation support. The fact that the team also provided implementation support to the DPL in support of the PMV also helped ensure senior government ownership and provided for more cost-effective supervision (this is often a challenge with smaller operations). The Bank team worked with the Moroccan authorities to resolve the issues related to slow processing of withdrawal applications and delayed disbursements, while not losing sight of overall physical progress with implementation. There were regular procurement reviews. ISRs were frank in their assessment of implementation difficulties as regards disbursements, environmental and social management monitoring, farmer participation and identification of appropriate training areas. Fiduciary staff worked actively with government counterparts to resolve disbursement issues. With strong co-ordination between the PICCPMV team, the Inclusive Green Growth DPL team and government, and the challenge of the cost of direct seeders, was addressed through support to a subsidy program in the Green Growth DPL series (2014-15) which followed the DPL in support of the PMV series.

85. **There were nonetheless some possible areas for improvement.** The question of definition of "adoption of climate adaptation measures" could have been further clarified during implementation. There were some issues regarding staff turnover and availability of environmental

specialists for the project, although the project had no substantive environmental risks. Parallel financing by Government is mentioned in the PAD but there is little discussion of it during implementation support, although counterpart funding was never an issue. The rationale for reducing funding to component 2 in the restructuring was not adequately explained in the MTR; there may have been cost savings, and additional activities were identified under component 1, including training in climate negotiations, a safeguard assessment and preparation of a field manual. There was also quite a long delay between the MTR, which included recommendations for restructuring, and the restructuring itself, which took place only one year before project closing.

### **(c) Justification of Rating for Overall Bank Performance**

Rating: Moderately Satisfactory

86. Linking implementation support to that of the DPL in support of the PMV made sense both strategically and from a cost-effectiveness point of view. While there were some shortcomings in project design, ISRs were frank in the way that they assessed challenges, and solutions were pragmatic. There was strong respect for government processes and government ownership of the program.

## **5.2 Borrower**

### **(a) Government Performance**

Rating: Satisfactory

87. **Government commitment to the project, which was embedded within GoM's broader strategy for inclusive growth and climate resilience and the PMV, was strong throughout.** Core government agencies helped resolve detailed implementation issues regarding disbursements and budget planning. Broad commitment is illustrated also by continued support for climate resilient agriculture in the PMV and green growth programs, both of which are also supported by the Bank. One possible area for improvement might have been improved collaboration between the Ministry of Agriculture and Fisheries, and the Ministry of Energy, Water and Environment, on the water resource aspects of the PICCPMV within the broader PMV context.

### **(b) Implementing Agency or Agencies Performance**

Rating: Satisfactory

88. **Implementing agency commitment was strong both on the part of ADA and the MAPM/DRAs.** Core staff of these agencies implemented the project without recourse to contracted implementation specialists, and without the need for incremental operating costs. Physical implementation proceeded even despite disbursement bottlenecks. ADA and the DRAs provided regular progress reports on the operation, and emphasized the learning aspect of the project for broader PMV operations. Detailed implementation issues, such as beneficiary concerns with service providers, or availability of inputs, were addressed pragmatically. The agencies are committed to follow up through broader dissemination and adoption of the results. The one area for improvement would be further monitoring of broader take-up of climate resilient agriculture by farmers, and a program to monitor the impact on yield resilience (for annual crops) and longer term survival rates, productivity (for tree crops), milk yields (for dairy cattle) and incomes.

### **(c) Justification of Rating for Overall Borrower Performance**

Rating: Satisfactory

89. **The PICCPMV was a small operation compared with most of those supported by Bank lending in Morocco**, and the fact that attention was paid to resolution of implementation bottlenecks is in itself illustration of commitment. There is commitment to scale up climate resilient agriculture through the broader PMV program. At the broader level, Morocco is regarded as a regional leader in its commitment to addressing climate challenges, and ADA has been certified as an implementing agency for the Climate Adaptation Fund.

## 6. Lessons Learned

### *On project design*

(i) **For small grant-supported operations, integration into broader programs supported by Government and the Bank increases the chances of success.** In this case the operation formed part of the PMV Pillar 2, was implemented through core government agencies without recourse to a dedicated PIU, and benefited from integration also with the DPL in support of the PMV.

(ii) **Small operations pose heavy transaction costs for the borrower, but these are justified if there is a learning element involved** which enables broader scaling up, either of the innovations supported, or of the procedures used, or both. In this case the project provided an opportunity to pilot climate resilient technologies at farm level, for scaling up in later programs. More broadly, a lesson is that small operations, including the GEF grants have a role to play in a World Bank Group portfolio dominated by larger operations, but require pro-active implementation support and strong government commitment. Key factors in success, which may be useful lessons for other small operations, include simplicity in design, mainstreaming implementation arrangements and monitoring into larger, ongoing operations, strong government ownership, and established mechanisms for working directly with project beneficiaries.

(iii) **Greater clarity at the outset on causality and attribution** would facilitate more rigorous assessment of outcomes, as opposed to outputs. In this case, specificity regarding the links between the activities supported under component 1, and the first key outcome indicator, would have been helpful. Finally, greater understanding of the cost-effectiveness and affordability of project interventions would be helpful.

(iv) **Although Pillar 2 projects focus on poorer, rainfed areas, since the operation was demand-driven, farmers willing to take up PICCPMV innovations were mostly the more innovative of farmers, and unlikely to be among the poorest.** A lesson is that an operation not directly focused on the poorest may nonetheless encourage inclusion, since demonstrations provided the opportunity for other poorer farmers to learn and follow suit.

### *On climate change adaptation in agriculture*

(v) **It would have been helpful to develop, as part of the PICCPMV, an approach for post-project impact monitoring**, on such areas as impact on resilience, yield or broader farmer uptake. Methodologies need to be adapted to different countries. More broadly, post project impact monitoring could systematically be included in project design for operations supported by the Bank. Boxes 1 and 2 below summarize the main lessons learned for the two groups of sub-projects carried out as part of Component 2.

(vi) **Institutional capacity assessments during preparation** need to address capacity for environmental monitoring as well as fiduciary aspects.

(vii) **The focus on only two groups of technologies in this operation was the right one.** There may be scope moving forward to develop a more comprehensive menu of viable climate resilient agricultural, land and water management technologies for Morocco, through support to research in future policy based operations or within the investment portfolio. The livestock sector and irrigation sub-sectors, for example, would benefit from a more comprehensive approach, as would field crops that are usefully grown in rotation with wheat, such as beans, lentils and other cereals.

**Box 1. Summary and Lessons Learned from direct seeding sub-projects**

Four PICCPMV sub-projects supported direct seeding into cereal-based systems in selected rainfed areas. The presence of INRA's experimental station close to the project area was a key element for effective implementation and sustainability. Although the interventions faced a number of hurdles, including lack of availability of direct seeders and inputs in the early years, the sub-projects were mostly successful. Promotion of direct seeding is embedded into government programs through 2020.

Experience indicates that the technology has the potential to raise yields, improve soil health and reduce costs and labor relative to traditional tillage systems. It is important, however, for Morocco to go the next step in maintaining soil health and the soil-plant-water-nutrient system, while encouraging crop rotation,<sup>32</sup> maintaining residue, maximizing soil biomass and minimizing use of external inputs. This concept is understood by INRA researchers but was not aggressively pursued in the PICCPMV, since the first priority was regarded as overcoming farmer resistance to new sustainable land management approaches.

One challenge to large-scale success in the broader transition to conservation agriculture remains the subsidy policy, which favors wheat over other crops that are important in the rotation system, specifically pulses, legumes and oilseeds. These crops need more attention in government programs. Value chains and the marketing system for these crops are not well established, pests and diseases need better management and access to improved seed needs to be facilitated.

A second challenge is the cost of direct seeders, which despite subsidies remain high. Service providers have a role to play in machinery leasing, and INRA is developing a local direct seeder (ECOSEEDER) which will soon be available on the market.

A third challenge is the availability of water, which will increasingly be a limiting factor. Seeding dates for different crops need to be tested on-site, as well as different crop sequences which produce adequate biomass to satisfy the competitive uses of residues as food, feed and mulch as well as producing competitive yields. There needs to be more attention to agro-meteorological services, with relevant information provided to farmers that is adapted to local conditions.

(viii) **Social assessments<sup>33</sup> during preparation can usefully shape project design,** including identification of the types of interventions which will have the greatest chance of success, appropriate participatory approaches, capacity building activities, and operational aspects including the approach to procurement.

**Box 2: Summary and Lessons learned from Cereal to Fruit tree conversion sub-projects**

Primary factors in design of the six PICCPMV sub-projects included soil/water conservation on the one hand, and support to improved varieties and farm systems that were better adapted to drought, with the potential for higher yields, on the other.

Water conservation structures such as *banquettes* have been used in Morocco since the 1960s. However, upstream water conservation can have an impact on downstream groundwater recharge rates. And some small-scale irrigation interventions were implemented without sufficient regard to availability of water for irrigation, either from groundwater, or from convenient surface water.

Introduction of new farm systems also had mixed results; poorer farmers felt unable to incur the transition costs in transferring to good agricultural practices, which involved restricting livestock grazing (to protect new plants or water conservation structures) and reducing the area dedicated to cereal production, even where the

<sup>32</sup> Rotation should be encouraged even before no-till systems are started, and straw should not be removed when no-till is introduced

<sup>33</sup> Not only social safeguard assessments which are much more limited in scope

interventions were designed to allow for inter-row cropping. Other recommended techniques, such as mulching or pruning, also faced some resistance. Increasing productivity and revenue per hectare over the short term as well as the long term is important but challenging with tree-crops, unless additional subsidies are provided to compensate for short term revenue losses. On the other hand farmers, especially the more commercially oriented, appreciated the higher revenue potential of improved agricultural practices and improved varieties.

In some cases it was challenging to differentiate PICCPMV interventions from those of the “base” PMV project, but this was largely because the base project included interventions which were “climate-smart” already, such as soil/water conservation and good agricultural practices.

The design lessons are that (i) interventions need to be carefully tailored to local circumstances, adopting, for example, different approaches for subsistence farmers<sup>34</sup> than for small-scale commercial farmers<sup>35</sup>; (ii) water availability and water governance need to be taken into account during preparation,(iii) it takes time to change local practices, and training and demonstration may need to be supported for longer than the project period; (iv) there is scope for further work on development of olive, almond and fig varieties that are adapted both to local geography and to domestic and international markets; and (v) in order to overcome transition costs, support to tree crops productivity can usefully be combined with measures to support annual crop productivity.

The implementation lessons are that (i) involving local farmers rather than “contracting out” to external service providers, increases the chances of success; and (ii) beneficiaries need to be geographically accessible to extension providers in order that support may be effective.

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

### **(a) Borrower/implementing agencies**

90. The comments sent by the Borrower on the draft document consisted mostly in requests for clarification on specific points and the final document incorporates additional elements to answer those queries. The main issue on which the Borrower expressed some reservations was the question of irrigation. The Borrower argued that irrigation was out of the scope of the project –which dealt exclusively with rain harvesting and water conservation techniques. While this is correct in reference to the initial design of the project, the ICR mission observed that farmers needed some small scale supplementary irrigation—as well as water harvesting measures—during the establishment phase of the tree crops (as referenced in Annexes 2 and 5), and in some cases water was not available. However—in order to avoid any confusion—the final text has been modified to stress the fact that the water needed in some PICCPMV sub-project only involved “supplemental” irrigation—as opposed to medium- or large-scale irrigation.

### **(b) Cofinanciers**

Not applicable

### **(c) Other partners and stakeholders**

*(e.g. NGOs/private sector/civil society)*

Not applicable

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34 This is the case for the beneficiaries of the following projects: Tadla-Azilal - Développement de la filière des amandiers; Rabat-Sale-Zemmour-Zaër - Reconversion des céréales en olivier; Doukala-Abda - Extension et intensification de la production oléicole.

35 These categories of beneficiaries are targeted by the sub-projects: Gharb-Chrarda-Beni Hssen - Extension et valorisation de la production oléicole; Chaouia-Ouardigha - Reconversion des céréales en olivier.

## Annex 1. Project Costs and Financing

### (a) Project Cost by Component (in USD Million equivalent)

Components	Appraisal Estimate (USD millions)	Restructuring revised (USD million)	Actual / Latest Estimate (USD millions)	Percentage of Restructuring	Percentage of Appraisal
1. Development of the capacities of public and private institutions for integrating climate change adaptations in agricultural projects in five target regions	0.5	1.3	0.65	50.25%	130.00%
2. Dissemination of climate change adaptations among farmers of selected Pillar II projects in five target regions	3.85	3.04	3.61	118.75%	93.77%
<b>Total Baseline Cost</b>	<b>4.35</b>	<b>4.35</b>	<b>4.26</b>	<b>97.99%</b>	<b>97.99%</b>
Cofinancing (Government)	26.95	26.95	22.37	100.00%	83.00%
<b>Total Project Costs</b>	<b>31.30</b>	<b>31.30</b>	<b>26.63</b>	<b>100.00%</b>	<b>85.08%</b>

Exchange rate at Appraisal: US\$1.00 = MAD 8.4

Exchange rate at ICR: US\$1 = MAD 9.76

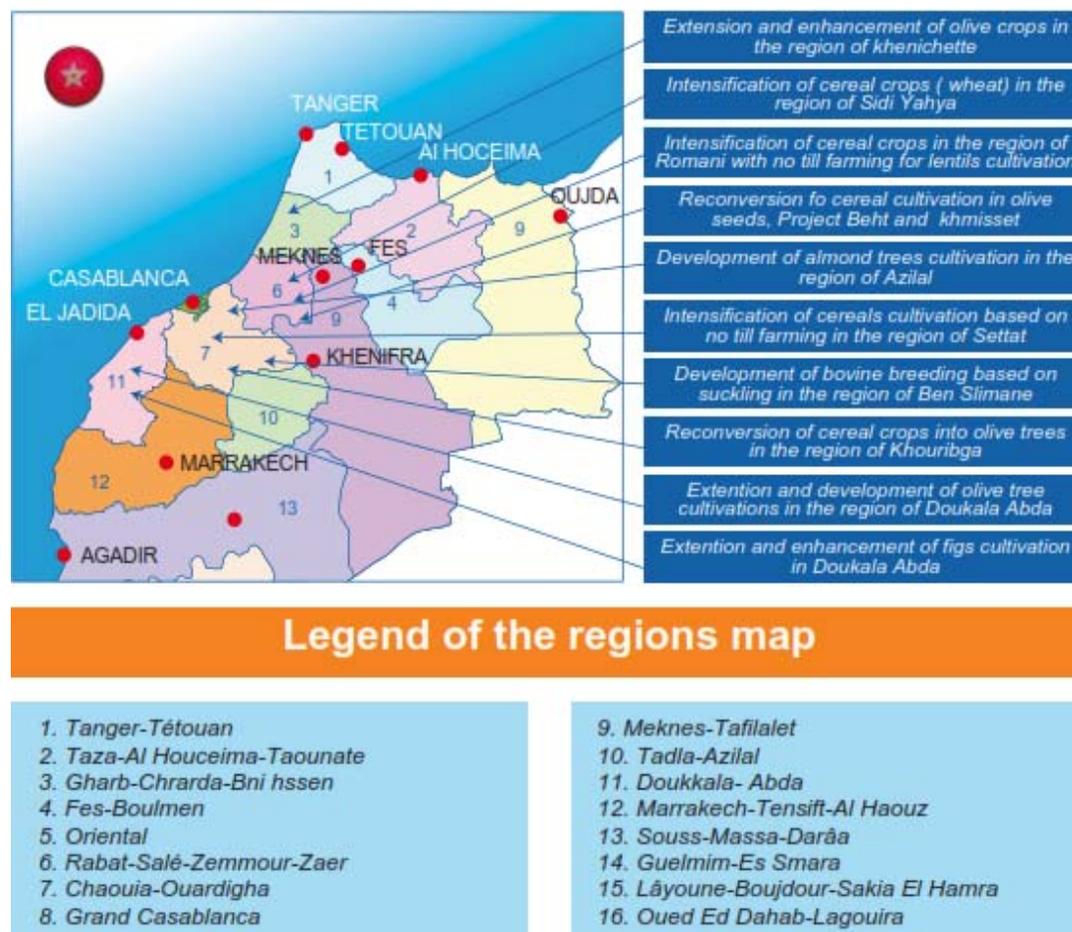
### (b) Financing

Source of Funds	Appraisal Estimate (USD millions)	Restructuring revised (USD millions)	Actual / Latest Estimate (USD millions)	Percentage of Appraisal
Beneficiary	26.95	26.95	22.37	83.00%
GEF	4.35	4.35	4.26	97.99%
<b>Total</b>	<b>31.30</b>	<b>31.30</b>	<b>26.63</b>	<b>85.08%</b>

## Annex 2. Outputs by Component

### 1. Project overview

Figure 1 - Project area (courtesy of ADA)



### 2. Outcomes and Intermediate outcomes

91. Table 1 below summarizes key outcomes and outputs (intermediate outcomes) by year. The following paragraphs provide more details, and the section on component 2 also describes the larger PMV project to which the PICCPMV project was attached.

Table 1 - Outcome and intermediate outcome indicators: targets and achievements (ISRs). (*The first set of figures in each column indicates the target at appraisal: the second set, in italics, indicates project achievements*):

<b>Outcome indicators</b>	Baseline	Year 1 <sup>36</sup>	Year 2 <sup>37</sup>	Year 3	Year 4	Project End
Percentage of Pillar 2 Projects in the five target regions integrating at least one climate change adaptation	zero	30% <i>30%</i>	33% <i>42% (20 out of 50 PMV projects)</i>	35% <i>38% <sup>38</sup></i>	36% <i>38%</i>	36% <i>45.9%</i>
Percentage of small farmers in the selected Pillar 2 Projects integrating at least one climate change adaptation	zero	15% <i>7%</i>	15% <i>29.3% 6,725 farmers out of 22,880.</i>	25% <i>38%</i>	35% <i>38%</i>	35% <i>43.2%</i>
<b>Intermediate outcome indicators</b>						
<i>Component 1</i>						
# staff of public institutions trained (cumulative)	zero	80 <i>Zero not reported</i>	120 <i>85</i>	120 <i>228</i>	120 <i>249 march 2015</i>	120 <i>264</i>
# staff of private institutions trained (cumulative)	0	25 <i>Zero not reported</i>	50 <i>34</i>	75 <i>194</i>	100 <i>197 march 2015</i>	100 <i>197</i>
<i>Component 2</i>						
# farmers in PICCPMV sub-projects integrating at least one climate change adaptation	0	1000 <i>138 to be updated</i>	1500 <i>659</i>	2500 <i>1679</i>	2500 <i>March 2015 2067</i>	2500 <i>2423</i>
#farmers in PICCPMV sub-projects benefiting from training & awareness activities	0	1300 <i>49 to be updated</i>	2000 <i>1556</i>	3200 <i>2341</i>	3200 <i>March 2015 2665</i>	3200 <i>3215</i>

### 3. Outputs and Outcomes Component 1

92. Under component 1, as reported in ADA's *Rapport d'Achèvement du Projet PICCPMV* ADA (Annex 7), ADA organized training (Table 2) and awareness raising activities to the benefit of:

- 249 staff of public institutions, including Ministry of Agriculture and Fisheries (hereinafter referred to as MAPM), Provincial and Regional Agriculture Directorates (DRA/DPA), Regional Chambers of Agriculture, Directorate for Development of Agri-Food Chains, Agency for Agriculture Development (Intermediate Result 1 - component 1).
- 197 professionals of private institutions, including professional agri-producers associations, private investors, traders, entrepreneurs, and service providers (Intermediate Result 2 - component 1).

<sup>36</sup>As reported in ISR archived in December 2012

<sup>37</sup> As reported in ISR archived November 2013

<sup>38</sup> There may be some system issues with the December 2014 ISR; the core indicators are not in it (they are in the June 2014 ISR) and this indicator appears to indicate a decrease over the previous reporting period; this timing corresponds with introduction of the new ISR format and there were many system challenges in the early months

Table 2: Awareness raising activities (ADA's *Rapport d'Achèvement du Projet PICCPMV ADA*)

<b>Trainings</b>	<b>Benefitting staff from Public Institutions</b>	<b>Benefitting professionals from Private Institutions</b>
Study tour/training on direct seeding in China	Representatives from the MAPM managers at central and local level	Farmers, producers of agricultural machineries.
Training for on climate change adaptation in the Netherlands	MAPM and ADA managers	
Training on climate change negotiation	MAPM and ADA managers	
Study tours within Morocco		Farmers
<b>TOTAL</b>	<b>249</b>	<b>197</b>

93. The awareness raising activities included: (1) information campaign on climate change through various audio and written media; (2) diffusion of radio spots on climate change and PICCPMV; (3) workshops. A list of activities and costs follows (Table 3).

Table 3: Awareness raising activities (ADA, *Plan de Passation des marchés pour Fournitures/Travaux/Prestations de services/services de consultants*)

<b>Activity</b>	<b>Cost [MAD]</b>
Provision of information and technical material	181 944
Project launch workshop	184 750
Project workshop on PICCPMV sub-projects and the ECIES stucy	10 000
Production of extension materials	495 600
Radio programs on PICCPMV	1 747 200
Radio programs on PICCPMV	1 651 757
Workshop on direct seeding	790 008
Mid-term review workshop	500 000
Procurement workshop	105 036
Audio messages on climate change in Arabic and French	116 400
Staff training for MAPM and ADA on CC	914 133
Assistance in monitoring and evaluation, including evaluation report	480 000
External audut PICCPMV	450 000
Study on direct seeding	781 200
Framework agreement on direct seeding with l'INRA	1 572 000

## Results

94. Consistent with objective outcome indicator 1, ADA reports that, in addition to the ten PICCPMV projects, 51 Pillar 2 projects out of the 111 implemented during the same period integrated at least one climate change adaptation measure fully funded by the Government (*Rapport d’Achèvement du Projet PICCPMV*).

95. However, there is a question of attribution. There is a correlation between the experience that ADA has developed in management of the PICCPMV and ADA’s current portfolio of projects with climate change elements, and accreditation as an agency eligible to implement projects under the Climate Adaptation Fund. This seems to confirm the effectiveness of the activities under component 1. Nonetheless, it remains difficult to prove a clear linkage between the intervention activities and these impacts. To confirm the impact of the PICCPMV on the 51 Pillar 2 projects, information would be needed on: (1) the nature of the climate change adaptation measures (are the adaptation measures implemented in the new projects linked to the content of the training supported by the PICCPMV?); and (2) the date the 51 Pillar 2 projects were designed (have the projects been designed after relevant staff has developed a new awareness of climate change?). The PICCPMV can be regarded as contributing to the integration of climate change into the broader PMV, but a direct causal link with sub-project activities is harder to determine.

## 4. Outputs and Outcomes Component 2

### 4.1 Projects for Fruit Tree Intensification

96. Six projects supported development of fruit tree value chains with activities that vary from (1) the conversion from grains production towards fruit tree growing, to (2) the expansion of the area planted, and to (3) production intensification. The regions targeted were Tadla-Azilal, Gharb-Chrarda-Beni Hssen, Rabat-Sale-Zemmour-Zaër, Chaouia-Ouardigha and Doukala-Abda.

97. In each target area, the most vulnerable (due to a combination of poor technical capacity and climate change impact) agri-food chains were converted to more locally adapted production systems centered around local species with income-generation potential: almond in Azilal (Tadla Azilal region); olive in Safi, Youssoufia, Sidi Bennour (Doukala-Abda region), Khémisset (Rabat-Sale-Zemmour-Zaër), Beni Zrantel, Boukhriss, Beni Batao (Chaouia-Ouardigha region), Sebt Gzoula (Doukala-Abda region); fig in El Jadida, Ouled Amrane, Safi (Doukala-Abda region).

#### (i) Almond tree improvement and value chain development (Azilal, DRA Tadla Azilal)

98. The PMV Pillar 2 project’s duration was 3 years from 2012 to 2015. The project covered an area of 2 400 ha and targeted 900 farmers in Azilal (in the Tadla-Azilal region). The main components included: (1) improved farming practices for almonds in mature plantations to increase productivity (30 000 trees); (2) construction and equipment of post-harvest facilities for a newly established cooperative; (3) post-harvest management and marketing (labelling); (4) strengthening the capacity of farmers and farmers' associations to produce, process and trade for the national market through the cooperative and prevent price manipulations by intermediaries.

99. Almond in the area are mostly spontaneous, self-propagated trees of different varieties (35 years old on average). Flowering times in each plot are highly variable. Productivity is very low: 100 trees/ha would produce on average 60 kg/ha shelled nuts, equivalent to 13 kg/ha of unshelled nuts. Locally-bred adapted varieties (late flowering, productive) are not available, as genetic selection has not received much interest from the research community. The quality of the land is poor, as soil is degraded and stony. Governmental subsidies are available to rehabilitate the land, but these are only accessible to farmers that have a formal land title, and access to capital. Harvest and post-harvest work is women's responsibility. They rake the fallen nuts onto stones, allow them to dry naturally, and deshell them manually. Shells are used as fuel in the household.

100. The price on the market (national and international) is relatively high and is increasing. However, farmers tend to sell to intermediaries, mixing nuts of different qualities. When the cooperative to be supported by the broader PMV project is operational, farmers will be able to receive a better price.

101. The PICCPMV sub-project introduced Good Agricultural Practices (including pruning, fertilization, water management) for the productive management of almond trees, and constructed 75 000 earth water conservation structures (*impluvia*) around trees for 218 farmers over 750 ha. According to the original sub-project, to maximize their water conservation potential, *impluvia* would need to be 3 m x 1.5 m. Most beneficiary farmers felt that *impluvia* of such dimensions were too big and would have penalized too much cereal production in the inter-rows (Figure 1). Each farmer ended up opting for different/customized dimensions. Despite the participatory approach adopted, *impluvia* are not well maintained by farmers and are sometimes removed to make more space for annual crops. In other cases grazing livestock damage the *impluvia*, but farmers do not bother to restore them. Ten training sessions reaching 208 farmers were provided on: (1) the impacts of climate change and almond production; (2) integrated agronomic management practices for almond trees; (3) growth requirements and pruning techniques. 64 farmers have also benefitted from 2 information visits to other projects dealing with almond production, and to post-harvest facilities in Souss-Massa-Draa and Marrakech-Tansift-Elhaouz. Climate change was used to motivate farmers to change the current tree management approach. Farmers are not used to taking much care of almond trees except at harvest: they may provide some manure, but typically they would not do any pruning nor phytosanitary treatments. The training on good management and pruning had mixed results.

Figure 1 - State of *impluvia* after project completion (left), soil preparation for cereal production (right)



Table 4 summarizes the PICCPMV sub-project activities, surface area covered, beneficiaries and costs.

(i) **Table 4 – Activities Costs and beneficiaries Tadla-Azilal – Almond value chains**

Type of intervention	Hectares	Cost (MAD)	Number of beneficiary farmers	Number of farmers trained	Cost (MAD)
Water conservation structures (75 000 <i>impluvia</i> )	750 (700*)	1 378 034**	218*** (380*)	64 (262*)	411 132**
Assistance technique de suivi des ouvrages des travaux des impluviums		139 200**			

Data source: ADA, Rapport d’Achèvement du Projet PICCPMV; \*\*\* ADA, Rapport d’Achèvement du Projet PICCPMV - Annex 1 ; \*\* ADA, Plan de Passation des marchés pour Fournitures/Travaux/ Prestations de services/services de consultants; \*\*\*

(ii) **Expansion and value chain development for olives (Gharb-Chrarda-Beni Hssen, DRA Beni Mellal)**

102. The Pillar 2 project’s duration was 4 years from 2011 to 2015. The project aimed at converting cereal production to olive production to diversify incomes and improve the productivity and quality of production. The project supported planting nursery-raised olive trees over an area of 2500 ha, and implementing water conservation structures: 4 basins over 500 ha to be used for irrigation purposes and as water points for the livestock. The local olive variety (*Meslala*) is characterized by good quality but relatively low drought tolerance (Figure 2). The varieties introduced (*Picholine marocaine*, the most common variety in the country, *Haouzia* and *Menara*) were selected based on their tolerance to low rainfall. For the first 2 years, the project also provided irrigation and improved farming practices (including fertilization, weed control, pruning) to support the successful establishment of the newly planted trees. Most farmers were reluctant at the beginning of the project. Their skepticism is explained by the low productivity of the existing extensive olive orchards in the area. However, thanks to the reassurances obtained with regard to the quality of the trees and the support offered by the project, 1300 farmers chose to participate. At planting, trees were between 12 and 24 months old and would reach maturity only after 4 to 5 years. Therefore the space between tree rows was left wide (10 m) enough to allow for farmers to continue growing cereals/legumes (Figure 3). In the first year of the project, farmers complained that the service provider responsible for the implementation recruited labor from outside of the

region and that the quality of the work was poor, with poor establishment of the trees. Following mediation by the administration, the service provider started to recruit local people (mainly the children of the beneficiary farmers).

Figure 2 - Trees planted by the project



Figure 3 - Soil preparation in the inter-rows



103. **From 2013 to 2015 (2<sup>nd</sup> year of the Pillar 2 project), the PICCPMV provided support for 2 additional years (18 months) of supplemental irrigation and good agricultural practices on 350 ha for 276 farmers, delivered 29 training sessions on olive growing and processing for 660 farmers, and organized 8 information visits.**

104. Drip irrigation systems in combination with groundwater abstraction were initially planned as part of the Pillar 2 project. However, when a drip system is installed on a slope, it is more difficult to maintain uniform pressure rates. Technical solutions are available, but they were considered too expensive. As an alternative, surface water was pumped from the Sebou's river and delivered by trucks in cisterns as part of the PICCPMV. However, no authorization was obtained for the abstraction of water.

105. The training covered production (including plant nutrition, plant protection, harvesting), post-harvest (processing, storage, marketing) and climate change. 2 field visits were organized to intensive olive orchards. Farmers tend to use excessive production inputs (especially fertilizers) which do not increase crop yields, but increase the risk of environmental contamination. Farmers were trained to avoid unnecessary input application and on state-of-the art processing techniques and storage standards. Climate change was addressed in terms of impacts on production, justifying the conversion of the cropping system promoted by the Pillar 2 project. Farmers perceive climate change in terms of higher weather variability, and agree that olives are more resilient. Climate change was also addressed from the perspective of greenhouse gas emissions, and linked to the polluting potential of olive-mill waste into increased awareness among farmers of the importance of making safe disposal of this waste. The PICCPMV activities supported the PMV project but the differentiation between the two in terms of what PICCPMV supported is not very clear.

Table 5 – Costs, beneficiaries & activities\_DRA Beni Mellal, Khenifra; Gharb-Chrarda-Beni Hssen – Expansion and value chain development of olives

Type of intervention	Hectares	Cost (MAD)	Number of beneficiary farmers	Number of farmers trained	Cost (MAD)
Good Agricultural Practices including Supplemental Irrigation	350	2 608 746**	276 (650*)	420 (565*; 546***)	1 154 958**

Data source: ADA, Rapport d’Achèvement du Projet PICCPMV; \* ADA, Rapport d’Achèvement du Projet PICCPMV - Annex 1; \*\* ADA, Plan de Passation des marchés pour Fournitures/Travaux/ Prestations de services/services de consultants; \*\*\* ADA, Huitième Rapport Semestriel sur l’Etat d’Avancement physique et financier du projet.

**(iii) Conversion from cereals to olive tree cultivation (Beht, Khemisset, DRA Rabat Salé Zemmour Zaer)**

106. The Pillar 2 project was launched in 2011 (and terminated in 2014) to address land degradation problems on hilly land. Similarly to the other PMV conversion projects, this intervention promoted the intensification of olive production and the transition from annual-based (i.e. cereal) to perennial-based (i.e. olive) cropping systems. Due to the absence of exploitable groundwater for irrigation, olive growing was considered to offer the only option for value-added agriculture. The planting layout of 10 x 7 m allowed for the need to grow cereals and maintain grazing areas for ruminants.

107. The project struggled to gain the interest of farmers. One reason was the excessively long lag between the start of the transition to the new cropping system and the time the new olive trees came into production (4 years). The most vulnerable smallholders, already constrained by scarce land resource for cereals production (that they mainly use to feed livestock), could not afford to reduce productive or grazing land during the transition phase. The PICCPMV sub-project was established to implement *banquettes* and support the establishment of the trees through a more efficient use of the rainwater. It was implemented on 180 ha from 2012-14 (Figure 4).

Figure 4 - *Banquettes* implemented by the PICCPMV sub-project



108. Most beneficiaries have about 20 ha of land in marginal areas and average cereal yields of 0.5 t/ha. This apparent inconsistency between the size of the land and the classification of the owners as smallholders is explained by the equivalence system introduced for land distribution in postcolonial Morocco. The amount of the land allocated to each beneficiary would depend on the value of the land; the reference limit for smallholdings is 5 ha in irrigated areas. Conversion formulas calculate the equivalent limit for smallholdings' size for each area.

109. Some of the beneficiaries adhered to the project without a clear understanding of the actual implications of it, and realized what *banquettes* really were only after their implementation. The DPA emphasizes a general lack of motivation/commitment on the part of farmers. Approximately 1/3 of the *banquettes* implemented were not maintained by the farmers afterwards. Geographical proximity was not used as a criterion for the selection of beneficiaries. This posed a challenge to the limited resources of the extensionists in Rabat-Sale-Zemmour-Zaër and Doukala-Abda.

110. Due to some disorganization at planting, it is difficult to correlate the effect of the *banquettes* with the rate of establishment of PICCPMV plants or with their vigor relative to the baseline in the Pillar 2 project (Figure 5). Trees were transported and dispatched with the roots wrapped in plastic. Some were planted in a timely way, others were left unprotected in the sun without moisture around the roots.

Figure 5 - Low establishment rate



111. The training addressed strategies for soil and water conservation in the face of climate change. Nonetheless, the overall perception of the farmers was that the practices promoted were not the most effective solutions available. Ploughing was erroneously regarded as the best practice to maximize water infiltration and conservation. *Banquettes* were felt as a less prohibitive solution suited only to those farmers that could not afford to repeatedly (“on a daily basis”) plough the land during the fallow period.

Table 6 – Activities, beneficiaries, costs: Rabat-Sale-Zemmour-Zaër – Conversion of cereals to olives

Type of intervention	Hectares	Cost (MAD)	Number of beneficiary farmers	Number of farmers trained	Cost (MAD)
Water conservation structures: construction (4200 <i>banquettes</i> )	120 (109*)	1 249 366 (1 577 846**)	40 (37***)	575 (537*; 270***)	622 527
Water conservation structures: maintenance	60	79 884			
Expendable Procurement		34 932**			

Data source: ADA, Rapport d’Achèvement du Projet PICCPMV; \* ADA, Rapport d’Achèvement du Projet PICCPMV - Annex 1; \*\* ADA, Plan de Passation des marchés pour Fournitures/Travaux/ Prestations de services/services de consultants; \*\*\* DPA, Khémisset.

**(iv) Conversion from cereals to olive tree cultivation (Khouribga, DRA Chaouia Ouardigha)**

112. The Pillar 2 project started in 2012 with a duration of 4 years. It mobilized 33 550 000 MAD to expand the area under olive production by 1 600 ha in Chaouia-Ouardigha. The interventions included the establishment of 5 crushing units, planting of olive trees, the implementation of Good Agricultural Practices for 2 years, and capacity building for farmers. 940

farmers benefitted from the project. The PICCPMV sub-project was introduced in 2014 to sustain the implementation of Good Agricultural Practice) for 2 additional years on 500 ha of orchards to the benefit of 329 farmers.

Figure 6 - State of the orchard benefitting from the PICCPMV sub-project



113. The project is appreciated by farmers, largely because of its revenue potential. Due to overexploitation of groundwater and the unavailability of surface water, the possibilities to expand irrigation are limited. Therefore, water conservation structures on slopes were well received. Some farmers are already undertaking good management practices at their own expense, including fencing their plots. However, they emphasize the following major needs and constraints: (1) the great need for capacity building on olive production; and (2) overall difficulties related to supplemental irrigation, varying from the complexity of the procedures to access subsidies (the costs of water transport are high and some of the farmers are not formally entitled to subsidies) to the lack of equipment (most importantly small tractors in sufficient number).

Table 7 – Activities, beneficiaries and costs\_Chaouia-Ouadigha – Conversion of cereals to olives

Type of intervention	Hectares	Cost (MAD)	Number of beneficiary farmers	Number of farmers trained	Cost (MAD)
Good Agricultural Practices (pruning, plant nutrition, plant protection)			329	225*	200 000
Expendable procurement (fertilizer, phytosanitary products)		1 550 000			
Non-expendable procurement (tanks for supplemental irrigation, sprayers, pruning shears, protective clothing)		600 000			
Water conservation structures ( <i>banquettes</i> )					

Data source: ADA, Rapport d’Achèvement du Projet PICCPMV; \* ADA, Rapport d’Achèvement du Projet PICCPMV - Annex 1

(v) **Extension and intensification of olive trees (DRA Doukkala Abda)**

114. Olive and caper are the most important crops in the area. In most cropping systems olive trees and caper bushes are grown together in rows, and annual crops are grown in the inter-rows (Figure 13). The *câprier de Safi* is the most adapted crop to the local climate as well as the most profitable agricultural value chain in the area. However, farmers expressed their need to improve the profitability of olive growing in rainfed areas (irrigation is not available). The Pillar 2 project was implemented on 13 000 ha to respond to this need: it rehabilitated 7 000 ha (with rejuvenation pruning, and plant nutrition) and intensified 6 000 ha. PMV interventions included also the establishment of 6 crushing units and capacity building for farmers. Geographical proximity was not used as a criterion for the selection of beneficiaries. This posed a challenge to the limited resources of the extension specialists.

Figure 7 - Olive trees, caper bushes and annual crops on the same plot



115. The PICCPMV sub-project was implemented on 150 ha two years after the start of the broader PMV project. It responded to farmers' need for improved olive management, and introduced an integrated approach to olive growing through: supplemental irrigation (to support flowering until fruit set and ripening), improved plant nutrition, plant protection, weed control, crop residue management. Capacity development had both theoretical and practical sessions. Table 7 summarizes the PICCPMV sub-project activities, surface area covered, beneficiaries and costs.

116. The service provider used local labor for non-technical work (such as trenching). All nursery-raised trees under the PICCPMV survived and overall plant vigor is visibly higher as compared to Pillar 2 trees: 15 percent of the trees that did not receive the adaptation measures did not establish. Despite farmers' appreciation, it is taking time for them to understand the rationale for all the management practices introduced, such as tree pruning. To grow cereals in the inter-row, farmers plough and damage the existing *impluvia*. Ploughing also brings stones to the surface. Farmers had heard of conservation agriculture, but despite its advantages felt that it was not compatible with uncontrolled grazing, and they could not afford solutions to this problem.

Figure 8 - State of the orchard benefitting from the PICCPMV sub-project



Table 8 – Activities, costs and beneficiaries: Doukala-Abda – Olive expansion and intensification

Type of intervention	Hectares	Cost (MAD)	Number of beneficiary farmers	Number of farmers trained	Cost (MAD)
Water conservation structures ( <i>impluvia</i> )	140 (150*)	324 969**	120 (150*)	1 040 (300* in the olive project + 300* in the fig project)	560 400** (for the olive project) + 193 200** (for the olive and fig project)
Good Agricultural Management (pruning, irrigation, plant nutrition)	250 (200*)	1 389 450**			

Data source: ADA, Rapport d’Achèvement du Projet PICCPMV; \* ADA, Rapport d’Achèvement du Projet PICCPMV - Annex 1; \*\* ADA, Plan de Passation des marchés pour Fournitures/Travaux/ Prestations de services/services de consultants

**(vi) Extension and value chain development for fig tree production (DRA Doukkala Abda)**

117. The Pillar 2 project aimed at expanding fig production in Doukala-Abda. The region is already renowned for its figs. Tree density varies from 150 plants/ha in rainfed areas (*bour*) to 500 plants/ha in intensive orchards in irrigated area. The project planted nursery-raised fig trees in Chaibate, Sidi Ali Ben Youssef, Ouled Amrane, Lamrasla, Nga, Laamamra (Figure 9). The 6 local ecotypes chosen (the most important being *Nabout*, *Koti labiad*, *Amber labied* are not registered varieties) are adapted to the territory and are suited to produce fruit destined for drying. For the first 2 years, the management of the orchard (including irrigation) was undertaken by a service provider.

118. Local fig varieties are not particularly suited for drying, and fruits are typically commercialized fresh, which poses problems linked to the perishability of the produce (such as transport and price). Therefore, as part of the project, post-harvest facilities of property of a newly established cooperative were constructed and are being equipped. This will allow to commercialize dried fruits and jam and ensure value addition.

Figure 9 - Fig trees planted through the Pillar 2 project and benefitting from the PICCPMV



119. The PICCPMV sub-project started in 2014 to support: (1) the purchase of 1 100 t of compost for use on 100 ha; and (2) capacity development *via* trainings and field visits. Table 8 summarizes the PICCPMV sub-project activities, surface area covered, beneficiaries and costs. By design, the sub-project aimed at supporting the purchase of *lombri-compost*, to be applied at 5 kg/plant in the 1<sup>st</sup> year + 12 kg/plant over the remaining years. Because the *lombri-compost* was more expensive as foreseen at design, the decision was made to provide farmers with locally purchased compost. However following disputes between beneficiaries of the PICCPMV and non-beneficiaries arose, in order to avoid conflicts, the compost was distributed to anyone (not just the beneficiaries) requesting it. With respect to this component, the difference between PMV and PICCPMV is very blurred. DPA estimates that the beneficiaries of the PICCPMV might have received 6 to 7 kg/ha, and other local farmers (who are in fig production but who are neither beneficiaries of the PMV nor of the PICCPMV) might have received around 3 kg/ha.

120. The training was delivered by INRA's staff, and addressed production (including plant nutrition, pruning techniques, climate-related impacts on production); processing; and packaging. Although figs are drought tolerant, the productivity of the orchard and the quality of the production are related to water availability. With drought conditions in late 2015 farmers were encouraged to mulch, but few followed this advice. Of the trees planted on February 2015, 8 percent have not survived. There were several reasons for this: some of the trees purchased were weak; irrigation water was not provided as needed; farmers could not prevent night grazing on succulent young trees.

Table 9 – Activities, costs and beneficiaries: Doukala-Abda – Fig tree expansion and value chain development

Type of intervention	Hectares	Cost (MAD)	Number of beneficiary farmers	Number of farmers trained	Cost (MAD)
Soil preparation and planting	100 (200*)	1 973 508	52 (150*)	1040 (300* in the olive project + 300* in the fig project)	See previous table
Expendable procurement (1 100 t compost)		550 000	520 (-*)		

Data source: ADA, Rapport d'Achèvement du Projet PICCPMV; \* ADA, Rapport d'Achèvement du Projet PICCPMV - Annexe 1; \*\* ADA, Plan de Passation des marchés pour Fournitures/Travaux/ Prestations de services/services de consultants.

#### 4.2 Projects for Annual Crops Intensification

121. Four projects concerned the development of intensification of cereal production in the regions of Chaouia-Ouardigha and Rabat-Sale-Zemmour-Zaër.

- (i) **Intensification of cereal production (soft wheat) (Rommani, DRA Rabat Salé Zemmour Zaer) and**
- (ii) **Intensification of cereal production (soft wheat) (Sidi Yahia Zaer, DRA Rabat Salé Zemmour Zaer)**

122. The Pillar 2 project aimed at increasing farmers' revenues through improving: (1) soft wheat productivity through improved crop management practices and trainings, and (2) the farm gate sale price. The PICCPMV sub-project contributed to the yield improvement component of the Pillar 2 project through support to three associations through supporting: improved seed material, adjusted crop calendar (early seeding), direct seeding, crop rotation (wheat - lentil), plant

protection, plant nutrition (based on lab analyses of soil samples). Farmers were requested not to allow stubble grazing and would receive feed from the sub-project.

123. Initially farmers were skeptical about the proposals, especially the direct seeding component. However, 65 farmers from Rommani participated. Each association received one seeder. The tine seeder ICARDA/Syria, did not perform well and was replaced with a different type of direct seeder. The farmers recognized that direct seeding reduced costs and labor time (especially in heavy soils), and guaranteed competitive yields in years characterized by above-average precipitation (46 percent higher yields 2012-2013) and in drought years (100 percent higher yield in 2011-2012, when farmers in tillage-based systems did not achieve any harvest).

124. In 2014, 100 farmers from the Sidi Yahia Zaer association asked to participate. The association received training, two direct seeders (1 from the Pillar 2 project and 1 disc seeder from the PICCPMV sub-project) compatible with their 80 HP tractor, which were used on 177 ha (Figure 10). Before seeding, fields were chiseled to remove the superficial crusting. The soil resulted very friable at the surface and allowed for good crop emergence (early stage). However, before transitioning to direct seeding systems, a subsoiler (or a ripper for shallower compaction layers) would need to be used to remove hardpans/plough soles. There is a risk that, due to the presence of compacted layers the rooting system will not be able to reach the deeper soil layers in the later phases of the growing cycle and will not establish properly.

Figure 10 - Direct seeder procured to the association in Sidi Yahia Zaër



125. The challenge for most farmers was the availability of sufficient crop residues for competing needs: soil coverage for soil improvement, plant nutrition and weeds smothering vs. feed, especially in dry years. Another problem faced during the transition to direct seeding systems is soil compaction. Despite these issues, the technology was welcomed.

Figure 11 - Wheat sown on the first week in January (Sidi Yahia Zaër)



126. In the trainings farmers learned the principles to calibrate the seeding rate, how to safely use and dose phytochemicals. They understood the importance of a diversified crop rotation and of crop residue management as essential accompanying elements of the direct seeding technology. However, one recurrent misconception was that standing residues would help protect the soil from the impact of weather and improve its fertility. Therefore they believed that harvesting all crop residues to feed the livestock and not allowing the grazing of stalks was a measure to improve soil fertility.

Table 10 – Activities, costs, beneficiaries: Sale-Zemmour-Zaër (Rommani, Sidi Yahia Zaër) – Cereal crop intensification (softwheat)

Type of intervention	Hectares	Cost (MAD)	Number of beneficiary farmers	Number of farmers trained	Cost (MAD)
Direct seeding operations (4 years)	500*	480 000** (522 849*)	68 (70*)	492 (503*)	591 534
Expendable procurement (Improved Seed Material, agrochemicals,	400*	2 530 789** (3 715 877*)			
Non-expendable procurement		1 585 100**			

Data source: ADA, Rapport d'Achèvement du Projet PICCPMV; \* ADA, Rapport d'Achèvement du Projet PICCPMV - Annex 1 ;\*\* ADA, Plan de Passation des marchés pour Fournitures/Travaux/ Prestations de services/services de consultants.

**(iii) Improved fodder production for dairy cattle (Benslimane, DRA Chaouia Ouardigha)**

127. The Pillar 2 project aimed at improving the performance of the livestock sector in Benslimane supporting the artificial insemination for 16 000 cattle and capacity development for farmers. The total beneficiaries were 4 300 farmers. The PICCPMV sub-project supported this effort for 77 farmers (total 400 cattle) introducing: (1) triticale for feed production (use as silage), as an adapted species (lower susceptibility to pests and diseases than most cereals) that is easy to establish, produces abundant biomass, smothers weeds and is recommended when first transitioning to direct seeding systems; (2) direct seeding; (3) integrated management (including

adjusted crop calendar, plant protection). Equipment provided included 3 direct seeders, 3 sprayers, 4 choppers, 2 trailers, 1 manure spreader. The sub-project was implemented over 400 ha.

Figure 12 - Silage production



The major constraints during implementation included:

- Limited availability of local triticale seed material.
- Late arrival of goods (direct seeders, phytochemicals, seeds).
- Widespread lack of suitable/experienced field machinery/service providers.
- Overall inefficiencies linked to land fragmentation.

Table 11- Activities, costs, beneficiaries: Chaouia-Ouardigha – Dairy cattle development  
Provisional compilation of costs and beneficiaries

Type of intervention	Hectares	Cost (MAD)	Number of beneficiary farmers	Number of farmers trained	Cost (MAD)
Direct seeding operations	400	577 320	77*	55*	716 215
Expendable procurement (improved seed material)		1 085 567.50			
Expendable procurement (fertilizers, herbicides)		795 254.20			

Data source: ADA, Rapport d’Achèvement du Projet PICCPMV; \* ADA, Rapport d’Achèvement du Projet PICCPMV - Annex 1

**(iv) Cereal intensification using direct seeding (Settat, DRA Chaouia Ouardigha)**

128. The Pillar 2 project aimed at improving cereal yields in the province of Settat by way of promoting direct seeding. The initially planned area to be converted to direct seeding amounted to

2 000 ha and the initially intended beneficiaries were 320. By the end of the project, the area actually covered amounted to 3650 ha and the beneficiaries to 493.

129. The PICCPMV project, intervening on 500 ha, introduced: direct seeding, improved seed material of adapted varieties (*Arrehane* for soft wheat, *Tomouh* for durum wheat, *Bakria* for lentil), adjusted crop calendar (early seeding), crop rotation, crop residue management and plant protection. The sub-project purchased: direct seeders and a manure spreader. Following the example of a pioneer farmer, others accepted the direct seeding approach and achieved higher crop yields, and reduced costs by 25 percent relative to tillage-based systems (baseline).

130. Some farmers accepted to reduce the seed rate, as advised by INRA, but few wanted to implement a cereal-legume crop rotation. The main reasons for not accepting to introduce legumes in the crop rotation were: (1) farmers were concerned about major infestations of *Orobanche spp.* (aggressive root parasitic weeds) they did not know how to deal with; (2) unavailable seed material at acceptable costs (legumes are not subsidized); (3) intensive labor required at harvest. Farmers were requested not to allow stubble grazing and received feed from the sub-project. Nonetheless, the animals were allowed on the fields to graze the stubble. No residue was left on the field. There were also issues with the seeders provided to one association, which were not adapted to local tractors or soils.

Table 11 Chaouia-Ouardigha – Intensification of cereal production  
Provisional compilation of costs (total cost\*\* 6 619 850 MAD) and beneficiaries

Type of intervention	Hectares	Cost (MAD)	Number of beneficiary farmers	Number of farmers trained	Cost (MAD)
Direct seeding operations	500 (2 000***)	636 000**	493 (320*)	373 (800**: 50 participants par sessions en 16 sessions)	
Expendable procurement (65 t of improved lentil seed material Bakria, 150 t of improved wheat seed material, fertilizers, herbicide, 65 t feed)		3 541 420**			
Non-expendable procurement (3 direct seeders, 1 manure spreader, 11 sprayers)		1 962 430**			

Data source: ADA, Rapport d’Achèvement du Projet PICCPMV; \* ADA, Rapport d’Achèvement du Projet PICCPMV - Annex 1; \*\* ADA, Huitième Rapport Semestriel sur l’Etat d’Avancement physique et financier du projet; \*\*\* INRA, Projet d’Intégration du Changement Climatique dans la mise en œuvre du Plan Maroc Vert (PICCPMV) - Etude sur le semis direct

### **Annex 3. Economic and Financial Analysis**

(Including assumptions in the analysis)

131. The US\$4.35 million grant under the PICCPMV strengthened the capacity of relevant stakeholders to integrate climate change adaptations in projects directed to small farmers in five target regions of Morocco. It developed the capacities of staff of public and private institutions involved in the planning and implementation of Pillar 2 projects on climate change adaptations (Component 1). In addition, the PICCPMV supported the dissemination of climate change adaptations among farmers (Component 2). At appraisal, it was estimated that 88 percent of the grant (US\$3.85 million) would be used to pilot climate change adaptations among farmers to demonstrate their additional advantage compared to the business as usual, while the remaining financing (12 percent, US\$0.5 million) would be used to influence the institutional process of selection and implementation of future Pillar 2 projects. At closure, the share was broadly in line with predictions, with 85 percent of the grant (US\$3.61 million) used to pilot climate change adaptations among farmers, while 15 percent (US\$0.65 million) used in support to institutional change.

132. Rates of return are not generally calculated for operations of this kind. About half of the project costs were used for training and capacity building, both for farmers and for public and private sector beneficiaries. The objectives of the project were framed in terms on capacity building not productivity increases. This was appropriate; the benefits in terms of more drought resilient yields as a result of the technical interventions can only be measured over a longer time-frame than the project investment period. Furthermore since in many of the sub-projects new technologies were being piloted, the unit costs would likely be higher than when these technologies are well understood and applied to scale. While there are two broad groups of technical interventions, sub-projects within each group do not all support comprehensive package of climate resilient approaches, and the number of sub-projects within each group is small. Annex 2 provides information on the unit costs of interventions. Costs averaged US\$ 136 per hectare and per year or US\$ 273 per farmer and per year for the cereal to tree crop conversion technologies, and US\$ 294 per ha and per year and US\$ 932 per farmer and per year for the direct seeding/crop intensification technologies. Averaged across all sub-projects, costs averaged US\$ 205 per ha and per year and US\$ 488 per farmer and per year (this is to be compared with estimated costs at appraisal of US\$ 310/ha/yr. and US\$ 344/farmer/year). Training costs averaged US\$ 50 per farmer for all sub-projects. The fact that actual costs were lower during project implementation than estimated at appraisal is a testimony to the project's overall efficiency. However, these numbers should be considered with caution. It was not possible at the level of this ICR to come up with useful cross country comparisons, given differences in geographical, policy and farm systems characteristics. As mentioned above, it would have been useful for the project to have included an activity to develop a longer term methodology for assessment of cost effectiveness of climate smart agriculture interventions.

133. More broadly, the approach to project design was highly cost-effective, since it sought to integrate with and influence a much larger government program and policy shift for agricultural development. Specifically, it influenced broader PMV and country policy regarding the importance of climate resilience in agriculture. Government has upscaled the adaptation component of the PMV program, and in recognition of the importance of helping farmers with the transition costs to direct seeding systems has implemented a policy of subsidizing the purchase of

direct seeders.<sup>39</sup> The simplicity of design, with only two components, and supporting introduction of only two new technologies, was another factor in its efficiency; it was not over-ambitious in scope ADA has been accredited as an implementing agency of the Climate Adaptation Fund and has recently received an initial grant of US\$ 10 million from this fund. ADA has also been accredited as an implementing agency of the Green Climate Fund. While operationally the project posed heavy transaction costs to meet World Bank fiduciary requirements, it had no dedicated PIU and used existing administrative structures for implementation. This approach facilitated mainstreaming and sustainability after the PICCPMV intervention ended.

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<sup>39</sup> The Bank-supported DPL in support of Green Growth has supported this policy shift.

## Annex 4. Bank Lending and Implementation Support/Supervision Processes

### (a) Task Team members

Names	Title	Unit	Responsibility/ Specialty
<b>Lending</b>			
Jean-Charles De Daruvar	Senior Counsel	LEGEM	Senior Counsel
Hassine Hedda	Finance Officer	CTRFC	Finance Officer
Julian A. Lampietti	Lead Program Coordinator	MNSAR	Lead Program Coordinator
Marie A. F. How Yew Kin	Language Program Assistant	GEN05	
Hassan Lamrani Irrigation Specialist	Sr. Irrigation Specialist	MNSWA	
Mohamed Khatouri	Lead Monitoring and Evaluation Specialist	OPSPQ	Monitoring and Evaluation
Andrea Liverani	Sr. Social Development Spec.	MNSSO	
Abdoulaye Keita	Sr. Procurement Specialist	MNAPR	Procurement
Anas Abou El Mikias	Sr. Financial Management Specialist	MNAFM	Financial Management
Andrew Michael Losos	Young Professional	MNSEN	
Gabriella Izzi	Program Officer	MNSAR	Agriculture and Climate Change Specialist
<b>Supervision</b>			
Franck Bessette	Sr. Financial Management Specialist	GGODR	Financial Management
Jean-Charles De Daruvar	Senior Counsel	LEGAM	Lawyer
Hassine Hedda	Senior Finance Officer	CTRLA	Disbursement
Gabriella Izzi	Sr. Agricultural Spec.	GFADR	Task Team Leader
Abdoulaye Keita	Sr. Procurement Spec.	GGODR	Procurement
Zakia B. Chummun	Language Program Asst.	GWADR	Program Assistant
Ruma Tavorath	Sr. Environmental Spec.	GENDR	Environment
Claudine Kader	Team Member	GWADR	Program Assistant
Laila Moudden	Financial Management Specialist	GGODR	Financial Mngmt.
<b>ICR</b>			
Gabriella Izzi	Sr. Agricultural Spec.	GFADR	Task Team Leader
David Olivier Treguer	Agriculture Economist	GFADR	ICR Task Team Leader

**(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)
<b>Lending</b>		
<b>FY10</b>		15
<b>FY11</b>	7.79	58
<b>FY12</b>		
<b>Total:</b>	7.79	73
<b>Supervision/ICR</b>		
<b>FY12</b>	4.78	53
<b>FY13</b>	4.92	33
<b>FY14</b>	12.75	75
<b>FY15</b>	11.79	
<b>FY16</b>	4.0	
<b>Total:</b>	38.24	161

## Annex 5. Beneficiary Survey Results - PICCPMV

134. This report summarizes the reactions of beneficiary farmers of the PICCPMV. Findings are based on individual interviews and focus groups. They focus on both problems encountered during implementation and on farmers' perception of benefits in terms of productivity, income, and resilience.

(i) **Almond tree improvement and value chain development (Azilal, DRA Tadla Azilal); visit on January 21<sup>st</sup>, 2016.**

135. **Location:** The project includes several settlements in the province of Azilal: Ait Taguella, Tanante, Tamda Noumercide, Aguoudide, Taounza, Tisqui, My Driss Ben Aissa project. The PICCPMV is concentrated in the area of Tamda Noumercide, located a few kilometers west of Azilal.

136. **Objectives of Pillar 2 project:** The objectives are to improve livelihoods of almond producers in the province of Azilal, restructure the sector through the strengthening the organizational capacities of farmers. PMV has provided an almonds crushing unit, and supported the planting of 900 hectares of almond trees, 350 ha in Azilal, 350 ha to 250 ha and Attab Ait Ait Oubel. The PMV project is managed by the DPA of Azilal.

137. **PICCPMV adaptation measures:** The project was located in Tamda Oumercide, which was chosen because of the presence of an active farmers' association. It focused on water storage and conservation, including bench terraces and water circles around trees, and water harvesting, to allow supplementary irrigation as part of integrated management of the almond trees. The project also supported fertilization, weeding at the sapling state, disease control and pruning, and constructed 75 000 earth water conservation structures (*impluvia*) around trees for 218 farmers over 750 ha.

138. Farmer commitment varied, in part because annual crops are intercropped with almonds: many farmers are not convinced of the benefits of impluvia and have requested that they are reduced to 90 cm diameter rather than the recommended 1.5m; there are also questions about the value of targeted summer fertilization and irrigation and pruning. For technicians of the Ministry of Agriculture, the challenge was to encourage a transition from an un-managed to a managed almond orchard. Yet farmers, who adopt the technical package can expect improved yields of 30 to 40 percent in the fifth year. Almonds enhance land values, and fewer farmers sell their land, an indication, according to farmers, that their financial circumstances have improved.

139. The PICCPMV also has supported technology training and a study tour to argan tree areas, whose aim was to highlight the importance of marketing. Women are generally responsible for shelling almonds but neither the issue of women's employment, nor that of the acquisition of own label in the region were raised by farmers during interviews. Establishment of women's cooperatives would facilitate marketing. Women extract argan oil using similar methods to what is currently practiced in the region of Azilal, where there is no mechanical crushing of almond nuts. The establishment of cooperatives would improve marketing conditions. The confectionary industry used to value the Asilal almond highly for its qualities of softness, its consistency and its oil content. However, oil from the area has lost its reputation with the development of bitter almonds mixed with sweet almond. Farmers and the local market are not aware of the higher value of bitter almonds most in demand by the cosmetic industry.

140. Equipment for mechanical crushing and packaging almonds provided under the PMV, could not be installed, despite the purchase of a building for this purpose, the cost of electricity connection proved to be too high, and the equipment was moved to a different location outside the project area. The almond tree is very vulnerable to cold and drought. Frost destroys flowering, while periods of heat lack of rain accelerates flowering. The choice of variety is a key element of climate change adaptation. The recommended varieties are Ferragnès and Ferraduel.

### **Impact and beneficiary perceptions**

141. The benefits of the project are not clear yet. Farmers lack finance for irrigation, which they consider to be an important adaptation measure, but the transition from a natural to a managed almond orchard will take time in an area with a tradition of intercropping cereals within almond orchards. More broadly farmers also believe that many of their children will move away, and that the local school is of good quality and will help them with new opportunities.

#### **(ii) Expansion and value chain development for olives (Gharb-Chrarda-Beni Hssen, DRA Beni Mellal); Visit on January 15, 2016**

142. **Location:** The project is located in the commune of Jorf El Melha Rural Municipality of Mrabih. Settlements include Had Kourt and Ouled Athmane, Zrahna, Beni Biad, Tleta and Ouled JaraII.

143. **Objectives of Pillar 2 project:** The objectives of the PMV Pillar 2 are the improvement and diversification of farmers' income by development of the olive sector, through increased olive productivity through better varieties and value chain development; quality improvement, including improved transport, storage and oil extraction rates through improved crushers; and recycling residues for livestock feed. The Pillar 2 project targets 1500 farmers on 2500 Ha over a 5 year period, 500 ha / year .

144. **PICCPMV adaptation measures:** The contribution of the PICCPMV is: Supplementary irrigation and water conveyancing (300 l / tree in 2 applications); Creation of new olive-growing areas; Establishment of beneficiary groups; farmer training. The PICCPMV target project 275 farmers on an area of 350 ha. Project coordination is provided by the DRA, with the zonal Centre of Works. The beneficiary partner is the Ouergha Reform Association. There are four cooperatives in the area, including 3 multiservice cooperatives and one cooperative which groups women. An olive oil extraction unit exists in the target area, which is also close to modern farms owned by large agricultural enterprises.

145. PMV supported establishment of olive plantations leaving 10 meter distance between each row and 5 meters between trees in order to allow intercropping for cereals or legume .The varieties selected were Moroccan picholine, Haouzia and Menara. The local variety Meslala, highly regarded for its quality taste, is less robust than the Picholine. During the first year, farmers reported difficulties, including delay and a high failure rate. They attributed this to the lack of care taken by the company in charge of the work. Subsequently, Ouergha association negotiated with the companies for recruitment of local farmers for hole digging, planting and pruning. Participants were selected in turn, or by drawing lots. Training was conducted for the beneficiaries, with 4 sessions in 2012 and 3 in 2013. There have been two study tours to model farms.

## **Impact and beneficiary perceptions**

146. Growers stressed the effectiveness of the training, especially for pruning, watering and also waste recycling in oil mills, as well as the need to adapt to changes in rainfall (late or excessive rainfall). They observed that the olive trees are more resistant to drought and rainfall variation than cereals. Olive groves easily outperform annual crops financially, and increase the value of agricultural land. Olives require more workdays than annual crops, in an area affected by high youth unemployment. The project participants have an improved crushing unit, and are able to undertake better collection and oil extraction. The average extraction rate in the area is 24 liters per quintal. The PICCPMV and PMV support combined assistance with improved olive tree production with processing improvements.

### **(iii) Conversion from cereals to olive tree cultivation (Beht, Khemisset, DRA Rabat Salé Zemmour Zaer); Visit on January 18<sup>th</sup> 2016**

147. **Location:** Rural communities Ait Mimoune Ait Siberne and Sfassif (tillage and plantations). Training beneficiaries are in five localities: Sfassif; Ganzra; Ait Mimoun; Ait Siberne; Khemisset. The PICCPMV has only worked at field level in Sfassif.

148. **Objectives of Pillar 2 project:** The key objective of the PMV Pillar 2 is converting cereal lands to olive groves. In 2011 the plan was to convert 2000 hectares for 400 farmers, with a final target 8000 ha at the end of the project. The total planned area over the life of the PMV project was 15,000 hectares. The conversion of grain crops to olive groves, with a target yield of 2.7 tonnes per hectare, would allow better soil conservation, mostly on hills exposed to erosion, increase in farmers' income and poverty alleviation, due mostly to increases in processing rates of olives (80 percent).

149. **PICCPMV adaption measures:** The sub-project supported supplementary irrigation and small works for better rainwater collection, for farmers on 180 ha, all in S'fassif. The beneficiaries were identified by the DPA Khemisset, with coordination by the territorial services of the Department of Agriculture. Farmer outreach was undertaken by the Green Morocco Association Tesghart Al Khir. Contractors constructed bench terraces on steep terrain, each 9 m with two olive trees per terrace. A distance of 5 m was established between each terrace, with 1.2 m wide ditch and a height of 50 cm. The plan was to construct 100,000 linear meters of terraces, or 500 meters per hectare at a cost of MAD 30 per meter (MAD 15,000 per ha). Reports on the amount actually constructed vary between 60 and 120 ha. While some farmers complained about the quality of the contractor and poor maintenance, others were satisfied and have themselves provided supplementary irrigation to their trees and protected them from grazing sheep. Training was provided to 225 farmers at 45 villages and was well received, generating additional demand from farmers in Ait Mimoune on water collection works, which could not be satisfied due to lack of budget.

150. On the hilly areas, between the Gharb plain and the foothills of the Middle Atlas, the water table on most of the land is difficult to reach and irrigation is not possible. Rainfall conditions and terrain often mean no other trees survive except olives, together cereal and livestock, with olives regarded as a supplement whose benefits in terms of soil protection are important.

## **Impact and beneficiary perceptions**

151. It is legitimate to question the contribution of the PICCPMV to climate resilient agriculture in the project area. The bench terrace and water catchment technologies date back to the sixties.

There seems to have been increasing soil loss, due to erosion and lack of maintenance, and loss of vegetation due to livestock herds grazing in newly planted orchards. The lack of participation of some farmers could be explained by the high investments required relative to the returns, and the challenging nature of the work. The main contribution of PICCPMV has been in training and awareness of investment opportunities; but further dissemination may be difficult given the reality of smallholder farming, and the need for mixed systems combining cereals, livestock and olives.

**(iv) Conversion from cereals to olive tree cultivation (Khouribga, DRA Chaouia Ouardigha); Visit on January 22<sup>nd</sup>, 2016**

152. **Location:** The villages selected were Beni Bataou, Chougrane and Rouached, in the Bijaad area.

153. **Objectives of Pillar 2 project:** The objectives are to improve farmers' incomes, stabilize their cash flow, create jobs, reduce rural-urban migration and reduce soil erosion through increasing olive productivity. The project was to Benefit 1011 farmers 1,600 hectares, at a cost of MAD 33.55 million. Finally, PMV aims to strengthen the professional organization of upstream producers and downstream value added chains, and better promote the production through the installation of crushing 5 units of capacity of 500 Kg / Ha each. Following some disagreements among associations regarding the location of a crushing unit, the decision was made to locate the project in the villages of Beni Bataou, Chougrane and Rouached, in the Bijaad area. The PMV was managed by the Agricultural Advisory centers, under the responsibility of the DRA and the DPA Khouribga. Several farmers' associations have been established in the last 15 years and are functioning well. Most farmers, especially in areas with low agricultural yield, asked to participate in the cereal to olive conversion project.

154. **PICCPMV adaptation measures:** The PICCPMV supported construction of bench terraces on slope above 5 percent prior to the planting of trees, in order to control water run-off and increase water availability to the trees. The PICCPMV project includes 500 hectares and 330 farmers. Despite initial reticence on the part of livestock owners, most farmers appreciated the benefits of the terraces. Training was provided on farmer organization, protection of plantations against livestock and good management.

**Impact and beneficiary perception**

155. Farmers are convinced that olive trees are better adapted to drought than cereal crops, are more profitable and increase land values. They expressed concern, however, about the declining water table in part due to excessive exploitation in the 1990s by migrant returnees, and the limited potential for irrigation water. The basin agency has delayed replying to requests for well drilling authorization. Transporting water is expensive.

**(v) Extension and intensification of olive trees (DRA Doukkala Abda); Visit on January 20<sup>th</sup>**

156. **Location:** Khemis, Doukkala Abda, Safi.

157. **Objectives of Pillar 2 project:** Planting and rehabilitation of 13,000 hectares of olive groves including 6000 Ha new plantings and 7000 Ha rehabilitation; supervision and technical training of farmers by private consulting engineers; the construction and equipping of six crushing units and the creation of six recycling cooperatives. The PMV has targeted an area of 250 ha owned by 171 farmers in the settlement of Khemis PICCPMV supports 150 ha of these 250 ha. The site was selected based on the presence of the Sadaqa association.

158. **PICCPMV adaptation measures:** Activities were carried out in Nga, and included supplemental summer irrigation, integrated management on 150 ha, specifically, including weeding, intercropping, pest control and fertilizer management. The project management was provided by the Doukkala Abda and CCA Safi. Their local representative is the agricultural advisory center of Sebt Gzoula, although there was a shortage of specialists to support the project. Capers are grown together with olives in the project area: farmers judge that they are the most profitable crop and well adapted to local conditions.

159. Farmer participation was strong in the project, with 171 out of 173 farmers participating; and the service provider recruited local labor. Training was also appreciated, especially regarding maintenance of impluviums, but also on planting techniques, crop management, olive pruning, supplementary irrigation, harvesting and value chain development. Most orchards combine capers and olives. The impluviums were included in the PMV but with rain, and plowing for intercropping, these are often destroyed. The PICCPMV has offset these failures particularly on sloping areas.

### **Impact and beneficiary perceptions**

160. Farmers stressed that olives are a secondary source of income to capers, but recognize the benefits of partial replacement of cereals by the olive tree, which are more resistant to drought. The benefits of olive trees need to be assessed within the overall context of living conditions of households in Ouled Alia, which are difficult. Exploitable wells for groundwater extraction are not available in the vicinity. Each household has to construct its own water structures which often serve domestic as well as livestock needs. Farmers are concerned that groundwater is polluted in the area, because of inadequate solid waste and sewage disposal. Farmers emphasized training of young people as a priority. Multiple age groups are taught in one class in the local school, and this affects quality. There is a lack of facilities for educating girls at a higher level.

#### **(vi) Extension and value chain development for fig tree production (DRA Doukkala Abda); Visit on January 19<sup>th</sup>**

161. **Location:** The project area for fig development included several settlements and provinces in the region of Doukkala-Abda: Sidi Youssef Ben Ali and Chaibate (Province of El Jadida) Oulad Amrane (Province Sidi Bennour) Lamrasla, N'gga and Laamamra (Safi Province). The field visit was conducted in Had Ouled Frej, near Mharza.

162. **Objectives of Pillar 2 project:** Extension and enhancement of fig tree production through area expansion of 1900 ha and improvement of 4400 ha; Increase in productivity from 3.6 tons/ha to 5 tons/ha; value chain improvement: construction of two packaging units, improvement in drying quality; increasing farmer income through production promotion and reduction in the role of intermediaries. Initially the project targeted 4500 farmers on 2,500 ha, including 1,000 ha in Abda and 1,500 ha in Doukkala.

163. **PICCPMV adaptation measures:** PICCPMV supported new planting, fertilization using compost and farmers training. The PICCPMV targeted 100 ha, with 42 beneficiaries, distributed throughout the project area. Recipients were selected based on their organizational capacity. The DRA of Doukkala-Abda and CCA El Jadida provided project coordination, together with local technicians. Farmers were organization comprised three associations which have formed a cooperative (IEG) for the economic and ecological development of Ouled Frej, established in 2012. Project activities started in 2014-2015 and included planting 100 hectares, holding 10 training sessions organized by INRA and organizing field visits to benefit 100 farmers, and the delivery of

1,100 tons of compost. Service providers were responsible for establishment and maintenance for two years. INRA training focused on improved management and productivity. The project supported the cost of mechanical equipment for digging holes for planting: because the best quality compost, on-lombri, was not available local compost was used.

### **Impact and Beneficiary Perceptions**

164. Farmers were initially concerned about costs, and skeptical about the value of spreading straw to conserve moisture in water conservation circles around the trees. They also mentioned lack of availability of planting material, and the need to protect the seedlings from grazing livestock. Nonetheless they consider that figs are a profitable crop, especially if properly graded and packed, and that there are employment opportunities in the value chain. A packing unit managed by IEG Ouled Frej is expected to be commissioned shortly. The land is privately owned, and irrigated land planted with figs fetches good prices. Because fig trees drop their fruit prematurely in times of drought in rainfed areas, figs are best grown on flat lands with irrigation. Groundwater resources are sufficient but need careful management. Farmers consider that Fig production and irrigation development need to go hand in hand, if farmers are to have access to export markets and compete with Turkish producers.;

(vii) **Intensification of cereal production (soft wheat) (Rommani, DRA Rabat Salé Zemmour Zaer), and**

(viii) **Intensification of cereal production (soft wheat) (Sidi Yahia Zaer, DRA Rabat Salé Zemmour Zaer); Visits on January 14<sup>th</sup> and February 1<sup>st</sup>.**

165. **Location:** Villages included Brachoua, Merhchouch and Jemaa Moullabled, extended in 2015 Sidi Yahia Zaerof. Meetings took place on 14<sup>th</sup> January and 2<sup>nd</sup> February with members of the Nour cooperative.

166. **Objectives of Pillar 2 Project:** The objectives are to improve soft wheat yields for 350 farmers by about 40 percent (from 12 Qx / ha to 20 Qx / ha) and improve the income of farmers through adoption of good grain production practices, grouping and larger scale collection and marketing of production.

167 **PICCPMV adaptation measures:** More drought resistant seed varieties, early planting and direct seeding, improved farm management practices. Initially PICCPMV project targeted 115 farmers farming 490 ha in three communes. Selection criteria were determined mostly by the presence of farmers' associations, potential for improvements and capacity of direct and indirect beneficiaries to assimilate the proposed innovations. Commissions were established, supported by local authorities, to identify beneficiaries. Management and coordination were provided by the DRA, with support from INRA researchers, and the participation of farmers' associations. Direct seeders were provided both by the PMV and by PICCPMV, and the cooperative does not distinguish between sources of funds. The PICCPMV also provided training on good agricultural practices, including managed seeding rates and use of herbicides. Nour cooperative supported the costs of direct seeding of 177 ha in the 2015-16 season but there were difficulties because of the initial hardness of the ground in part because of previous trampling by livestock, and lack of vegetation cover and moisture.

## **Impacts and beneficiary perceptions**

168. Nour cooperative members' perceptions have been affected by the 2015-16 drought, which has raised the price of fodder; farmers feel obliged to continue to use stubble for pasture. They appreciate the benefits both of direct seeding and of crop rotation combining legumes, even though fallow continues to be common practice in some areas. They also consider that the development of their area is affected by land constraints, rainfall and marketing conditions. The size of farms is uneven, with many less than five hectares as well as some landless farmers. Part of the land is titled to the National Agency of Land Conservation. Much remains under the status of Melk, which is a form of private property based on a note prepared by traditional notaries (adouls). This form of ownership provides less collateral than modern land titles for the Credit Agricole, the main funding body for the members of the cooperative. Farmers who are landless or short of land generally prefer to rent rather than to sharecrop since rents are reasonable and in the case of sharecropping he receives only a quarter or a third of the crop while he supports all operating expenses. The price of land varies depending on proximity to urban areas and availability of groundwater.

169. Access to groundwater is an increasing constraint: Permissions are generally no longer granted by the basin agency and dossiers submitted have not received responses. Farmers are aware of the operating limits of the water table which is only accessible in low-lying areas; nevertheless they do not envisage, at present, collective and adaptive management of groundwater resources. Grain farmers consider that climate change is causing problems, either because there is not enough water, either because there's too much at once. The water causes diseases for men and livestock and contributes to severe soil erosion. Plastic bag pollution from nearby cities is an additional challenge. Flying plastic bags cause difficulties in the planting season and increase costs in two ways. Farmers have to clear their fields before planting, and cattle health is threatened by ingestion. Cattle, because they swallow directly, are more exposed than small ruminants such as sheep that chew before they swallow.

170. There are also issues of access to finance for equipment, service quality, and marketing. In farmers' view there are opportunities for employment in the cereal value chain, including in the science of good agricultural practices, equipment maintenance, input preparation, organization of traceability, storage, conservation and marketing. A more systematic approach to training and knowledge acquisition is desirable. Most farmers' children do not wish to farm themselves but higher quality, specialized apprenticeship and training programs are necessary.

171. In conclusion, farmers have a measure of confidence in techniques that are offered even after noting the various risks associated with changes in their farming practices. Direct seeding is a recognized global technology package likely to improve returns, strengthen the resilience of crops to increase and stabilize income. Benefits from the technology will depend also on improved conditions of commercialization and financing. Traceability and the development of grain production under supply contracts established with groups of millers is the development trend of the industry. Young farmers should be trained in computerization and modern farming.

### **(ix) Improved fodder production for dairy cattle (Benslimane, DRA Chaouia Ouardigha); Visit on January 12<sup>th</sup>.**

172. **Location:** Sidi Bettache, Ennasr Bir Ouled Yahia El Ghaba Moualine, Moualine El Oued Mellila, Ahlaf and Ziaidafarms. A meeting with the beneficiaries took place on January 12, 2016, at the headquarters of the cooperative Mabrouka, near the town of Benslimane. There was a visit to a farm located a few hundred meters from the headquarters of the cooperative. Participants

included cooperative members from different communes, the local veterinarian, and staff from the DRA, ADA and MPA.

173. **Objectives of Pillar 2 Project:** To modernize and improve dairy livestock productivity and relieve pressure on rangelands, forests, and fallow land; organize farmers into cooperatives and / or associations; Improve their income; provide incentives to farmers to cross-breed cattle and to identify them, on order to permit traceability. Interventions include artificial insemination; fodder production; cooperative organization and value chain enhancement by an aggregator. Target: 4300 farmers, 16,375 cows (local variety: 41 percent crossed: 59 percent).

174. **PICCPMV adaptation measures:** Introduction of triticale using direct seeding. The sub-project benefited 77 farmers in seven communes, owning 400 heads of cattle and 400 ha, an average of 5.8 ha per farm. Selection of plots for direct seeding was carried out by a commission established by the DPA. The selection criteria included land characteristics, presence of the professional organization, responsiveness of the associations and presence of technical assistance.

175. The project is supported by the CCA Benslimane Mabrouka in partnership with the cooperative for dairy production. The project monitoring team (DPA Benslimane) undertook regular field visits to monitor the services provided and oversaw the delivery of equipment. An agreement for the use and management of this equipment was signed by the DRA Chaouia Ouardigha. Established in 1990, the Mabrouka cooperative, Hassania, Benslimane, includes 60 commercial farmers and 500 small farmers who take their milk to collection centers. Its main objective is to improve the income of its members. It manages four milk collection routes from small farmers (direct delivery or collection through collection centers). It also supplies cattle food, and livestock equipment. It supports farmers in the preparation of grant applications (imported heifers; nurseries; industrial processing) units and provides technical monitoring. It offers artificial insemination and milk quality control services. It organizes awareness and training activities (dairy controls; training of technicians, study trips and visits to trade shows in Morocco (SIAM COPAG) and abroad. The cooperative has a team with a veterinary doctor, 8 AI technicians and 5 milk controllers and has established close partnerships with the DRA, CCA and ONSSA.

### **Project impacts and Beneficiary perceptions**

176. Despite early operational difficulties such as availability of seeders and seed, the interventions were appreciated by farmers. Green fodder yields are high and have exceeded, in some cases, 65 tons per hectare (as reported by beneficiaries), with an average yield of 50 tons per ha. Triticale is more drought and pest resistant and has higher yields than maize fodder. Silage produced from equipment provided was reported to be of good quality. Although triticale was used in the 1980s, extension efforts were not continued and interest has revived only since 2010. The PICCPMV intervention, focusing on fodder, complements well the PMV interventions which are focused on animal production and marketing. The experience of Mabrouka cooperative will have accelerated the dissemination of triticale. It will provide incentives for professional organizations and public authorities to lift the two main constraints: lack of triticale seed and insufficient availability of direct seeders.

(x) **Cereal intensification using direct seeding (Settat, DRA Chaouia Ouardigha); Visit on January 13<sup>th</sup>, 2016.**

177. **Location:** Participating communes included Ouled Said-Gdana, Ouled Sgheir, Tamdrou, Si M'Hamed Ben Rahal and Talouait. The visit took place on Wednesday, January 13, 2016 and began with a meeting of INRA, at the dryland center in Settat. Meetings continued on the ground

at the headquarters of one of the associations of farmers in the project. The Gdana association includes members of the cooperative Agrarian Reform Gdana in the rural commune of Ouled Said. Participants included officials of the ADA, the DRA and CCA, as well as researchers from the INRA and representatives of farmers' associations. Direct beneficiaries were present during the visit in the fields. Interviews with focus groups were conducted.

178. **Objectives of Pillar 2 project:** The Pillar 2 project has set a goal of planting 2000 ha by direct sowing. This objective involves the purchase of 4 service units (tractor + drill + sprayers) and services for Improved technologies (fertilization based on soil analyzes (500 composite samples) and application of herbicides); technical assistance and training, and product value enhancement through the purchase of four winnowing machines. Target beneficiaries (320 farmers on 2,000 ha) are small farmers with fragmented plots of privately owned land (“melk”). The sub-project target is exactly the same as for the main PMV project. INRA selected beneficiaries based on contacts already made

179. **PICCPMV Adaptation measures:** Improved and certified seeds (for soft wheat, a midge resistant variety *Arrehane* and for durum wheat a drought resistant variety *Tomouh*); and direct seeding early in the growing season (with a special drill, weed control, residue retention and in rotation with legumes. The project was coordinated by the DPA with researchers at INRA (dry farming center Settat) and Agenda Association. Following the PMV project, INRA has supported six participating associations in PICCPMV sub-projects in Settat. The PICCPMV was implemented on the basis of two agreements: a national agreement between the ADA and INRA and a regional agreement linking the DRA with the INRA dryland farming centre.

180. The project anticipated that service providers would perform the work under the project PICCPMV. But the most often communities preferred to undertake the work themselves: In five out of six sub-projects, farmers paid themselves for the work of direct seeding. Only one association has established a contract with the provider, which gave preferential prices to the association instead of waiting for payments from the market place

### **Project impacts and Beneficiary perceptions**

181. At project start male out- migration impacted crop cultivation. But there was a strong degree of family solidarity and self-help among farmers. There were also potential conflicts regarding use of rangelands and sharing arrangements for collective lands. High levels of illiteracy and low levels of farmer organization persist. The target was 1,000 ha, including 320 farmers on 500 ha funded by the World Bank (financing seeds and herbicides), and 500 ha self-financed by the farmers themselves. In practice, 493 farmers benefited from direct-seeding operation over 4900 ha in the PICCPMV. Farmers recognize that direct seeding has reduced costs by 25 percent over conventional approaches and have changed cultivation methods. They have also reduced seeding rates. But they have not followed recommendations regarding introduction of cereal-legume rotation systems; only 163 ha were sown to legumes. Cereals also provide fodder for livestock from grazing on stubble and preferred also because wheat seed is subsidized, cereal prices are supported by government, and labor costs for weeding are lower than for pulses. Furthermore legumes are affected by broomrape which is difficult to control.

182. According to farmers of Gdana association, farmers accepted direct seeding only gradually, but now appreciate that direct seeding can reduce costs and improve yields. Grain farming in the project area remains highly dependent on rainfall, while in lower areas there are serious constraints to using groundwater. According to estimates of INRA, from the observation of 50 farms in the project area, the cost per hectare of wheat cultivation by direct seeding is 12 percent lower than the

cost price according to the conventional method. The average yield increase from direct seeding over conventional methods was 16.54 percent. The project experience has also helped to change the mentality of ministry staff, who have seen the benefits of the new technology.

### **Operational recommendations**

183. **Beneficiaries:** There is not always a clear distinction between beneficiaries of farm level activities (and these farmers may be active farmers or absentees) and training participants. There are not always registers of training participants and there may be some double counting. It was agreed with ADA that clearer principles for selection of beneficiaries in both field level activities and training would be established.

184. **Impact of training:** Most technologies are already known and practiced, but by only a few farmers. The aim of the project is to increase the rate of adoption of more resilient approaches. The key indicator in this area is the demand for training. But the project has not provided a systematic schedule of training offered (catalog, calendar, locations and numbers of places) or a system where farmers can register their interest. A more systematic approach needs to be adopted by ONCA, which is still a new organization.

185. **Economic rate of return:** PICCPMV activities: There are three dimensions: the unit cost of activities; the impact of activities on revenue per hectare; and the multiplier effects through acquired knowledge. All proposed actions (direct sowing and retraining, according to the different variants) have the effect of improving income. INRA observations have provided evidence of the potential for cost savings, 30-40 percent on direct seeding, as well as substantially increased revenues compared with cereal.. The only question is that of transition, especially of the smallest farmers, who remain more committed to the pastoral activities than farmers with more land.

186. **Beneficiary Selection:** Beneficiaries were not selected according to poverty criteria, but according to geographical criteria including climate vulnerability and the predominance of rainfed agriculture, as well as the potential for technological modernization. The selection of beneficiaries within these areas was based on the criterion of receptiveness to new techniques and the ability to broadcast. It follows, in a context of relatively low social differentiation in agriculture, that there would be a focus on the more literate, better organized farmers. The PICCPMV was not poverty targeted. Similarly, the PICCPMV had little impact on women, where the main constraint, especially in remote areas, is access to education. Value enhancement (from improved harvesting techniques, pressing olives, crushing almonds, dried figs; product packaging; dairy processing; establishment of nurseries ...) is part of the overall approach of the PMV. The PICCPMV together with PMV and enterprise development may improve employment prospects for youth and women; but this will take time. Few data were collected on this. There are more job opportunities for women in arboriculture than in grain farming which is basically mechanized. Women can intervene in pruning, harvesting and processing of the crop,

187. **Improving the monitoring capacity of ADA and ONCA (Office National de Conseil Agricole).** It would be useful to strengthen the administrative follow. Records of beneficiaries and field activities should be established, and travel allowances should be increased for extension agents to permit more intensive field work. Administrative monitoring could be combined with analytical monitoring by INRA and university researchers. This approach would be more cost effective and help build capacity of young researchers as well as their understanding of climate resilient agriculture. A Farm Register is currently being set up that will help to trace the technical progress made by farmers.

## Summary and Conclusions

188. The PMV is supporting Moroccan agriculture at a stage in its evolution from a technical model based on family farming which is for the most part no longer competitive or sustainable, to a more advanced technical model. The increasing obsolescence of a mixed farming system, combining cereals and livestock, can be explained by increasing human and livestock pressure on land, together with agricultural practices which do not protect or allow for the regeneration of land and water resources. Soils have become less fertile and increasingly vulnerable to erosion.

189. The PMV was designed to develop agricultural potential through support to increased productivity and value chains. However, PMV initially did not explicitly address climate change adaptation. The PICCPMV was designed to address this gap and help farmers adopt more climate resilient practices. Climate resilient agriculture in the Moroccan context includes the introduction of technologies which conserve water and soil fertility, which replace conventional tillage with direct seeding, development of drought resilient seed varieties and replacement of cereal crops by tree crops. Adoption is constrained by insufficient knowledge of improved technologies and lack of finance, especially in the case of small farmers. Project design includes two main elements: training, and implementation on the ground at a large enough scale to demonstrate convincing results. The field visits demonstrated, for the most part, strong demand from farmers for increased understanding of the new technologies. However, the PICCPMV addressed only some of the constraints. Farmers are aware that tree cultivation and good agricultural practices are only part of the solution; more rational irrigation management and improved groundwater management are also indispensable. Farmers are also aware that organization is a key element in integrated climate adaptation management, and that up-front finance for investments is needed.

**Annex 6. Stakeholder Workshop Report and Results**  
(if any)

Cf Annex 7.

## **Annex 7. Borrower's ICR<sup>40</sup> and/or Comments on Draft ICR**

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<sup>40</sup> The report presented here is a summary of the Borrower's complete ICR, which is available in Project files. In addition to the key project outcomes presented in this summary report, the Borrower's complete ICR notably includes very detailed cost figures by sub-project which have been used to carry out the Bank's ICR.

Results and findings of the Integration  
of climate change In the implementation of the  
Morocco Green Plan (PICCPMV) Project

Capitalization Report



PICCPMV

INTEGRATION OF CLIMATE CHANGE TO THE IMPLEMENTATION  
OF THE MOROCCO GREEN PLAN

Ministry of Agriculture and Maritime Fisheries  
Agency for Agricultural Development

August 2015

ROYAUME DU MAROC



Ministère de l'Agriculture  
et de la Pêche Maritime



وكالة التنمية الفلاحية  
AGENCE POUR LE DEVELOPPEMENT AGRICOLE



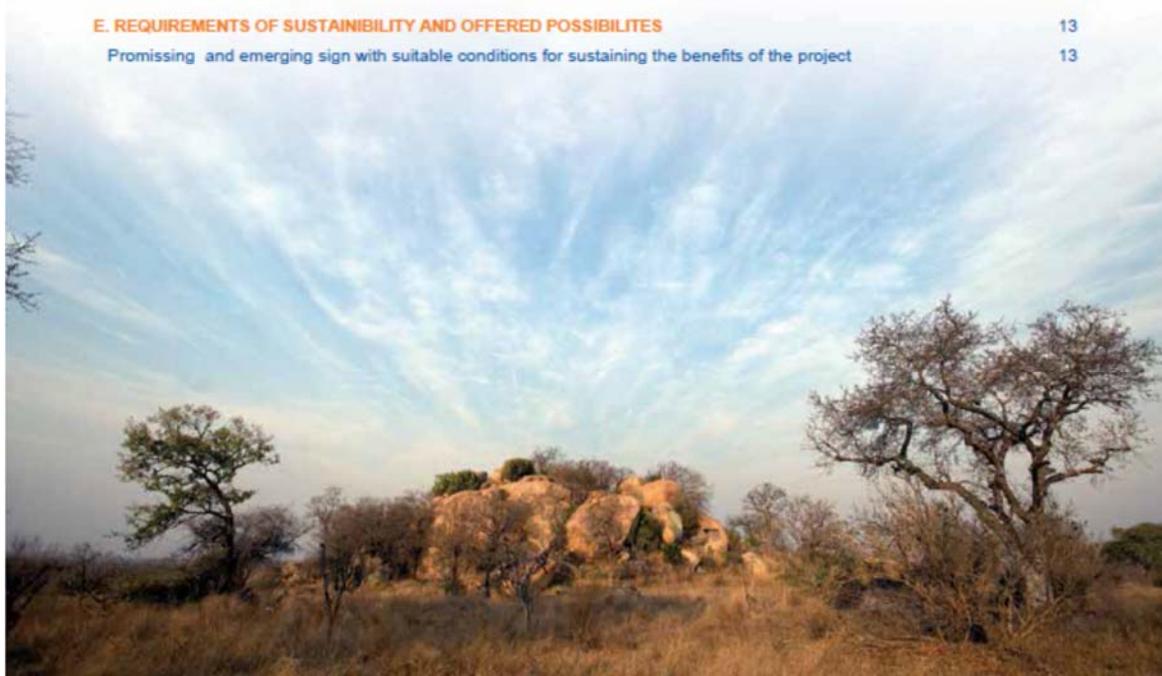
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# Table of Content

<b>A. CONTEXTE</b>	04
A PICCPMV aligned with the PMV reinforcing its environmental dimension	04
The PMV confronted to a crucial turning point on a national level in favor of the environment	05
The PICCPMV marks the crossing from conception to work field implementation, in adaptation to climate change	05
<b>B.THE PROJECT AND ITS RESPONSE PROFIL</b>	05
B.1. TECHNICAL CONSISTANCY	05
The packages of intervention are well defined and adaptable to the characteristics of different sites.	05
B.2. ENVIRONMENTAL AND CLIMATE CHANGE DIMENSIONS OF THE PROJECT	05
The predominance of the environmental dimension focused on the adaptation to climate change	07
Actions are oriented towards the promotion of a conservation agriculture and focused on diverse farming rotation and no till farming	07
<b>C. IMPLEMENTATION APPROACH</b>	09
C.1.ORGANIZATION AND MENTORING	09
C.2. A CLOSE SUPERVISION	09
A close supervision backed up with studies and workshops and meetings of exchange and follow up	09
<b>D. OUTCOMES AND BENEFITS</b>	10
D.1. CEREAL DEVELOPMENT AND NO TILL FARMING SYSTEM PROMOTION	10
Firm and advances in work field outcomes that are probate and crucial in situations of drought	10
D.2. AXE OF ORCHARD CROPS IN SLOPPY AREAS	12
A clear relevance in conservation of water and soil	12
D.3. ACHIEVEMENT IN TERMS OF INTERVENTION MEASURES	13
Another momentous outcome : a useful experience in terms of product management of such scope and nature	13
<b>E. REQUIREMENTS OF SUSTAINABILITY AND OFFERED POSSIBILITES</b>	13
Promising and emerging sign with suitable conditions for sustaining the benefits of the project	13





## A. CONTEXT

### A PICCPMV aligned with the PMV reinforcing its environmental dimension

The Green Morocco Plan (PMV); The agricultural development strategy established by the ministry of Agriculture and Maritime fisheries (MAMF) since 2008, places a strong focus on environmental and social issues. It's advocated as a privileged framework for integrating environmental concerns into agricultural development programs and activities.

Compared to earlier strategies and policies supported by the agricultural investment code of 1969 and the rural development strategy of 2000, The PMV represents a further step and a real quantum leap in Morocco in terms of integrating environment into agriculture.

PMV based on its second pillar (Pillar II), promoting the development of solidarity agriculture, emphasizes on the importance granted henceforth to the environmental and social dimensions in the policies and legislations of agricultural development

Aligned with its environmental orientations, PMV gives prominence to a series of programs and structural measures focused mainly on:

- Conservation and valorization of water usage in agriculture
- Diversification of agricultural rehabilitation systems
- Energy saving in agriculture
- Adaptation to climate change.

The PICCPMV was established to contribute to the implementation of the PMV environmental objectives, aimed at an increased preservation of natural resources and a sustained development for Moroccan agriculture, mainly by the reinforcement of its adaptation to climate change.

## **The PMV confronted to a crucial turning point on a national level in favor of the environment**

The PMV is occurring and evolving in a national context that is characterized by a rising concern about the consideration of environmental aspects in policies and the predominant interest granted to climate change.

The country had been engaged, for the past decades, in the process of integrating the environmental aspects and continues to multiply its initiatives and strategies in favor of the environment, and therefore keeping pace with the international momentum.

Its noteworthy to mention the considerable advances in the recent years , such as the National Charter for environment and sustainable development set in place in 2011 (NCESD), the institutionalization of the rights to a healthy environment and sustainable development by the new constitution, and the creation of the Economic, Social and Environmental council.

## **The PICCPMV marks the crossing from conception to work field implementation, in adaptation to climate change**

The PICCPMV holds a major significance in the undergoing process of promoting sustainable development in general and the integration of climate change in agriculture in particular

The PICCPMV is considered as a substantial qualitative leap forwards and a key step in the process of moving from a phase of conception and creation of frameworks to a phase of implementation and performance in field operations. Hence, The PICCPMV represents an essential and critical element in the process of integrating climate change in agriculture in Morocco

The opportunity offered by the project, and the encouraging results obtained thus far, deserve to be highlighted as a supporting point in all events and programs for promoting and raising awareness about the integration of environment in agriculture

## **B.THE PROJECT AND ITS RESPONSE PROFIL**

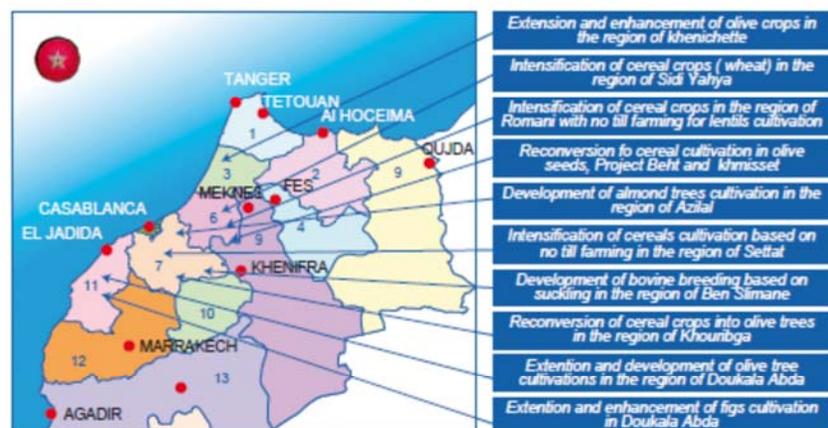
### **B.1.TECHNICAL CONSISTANCY**

**The packages of intervention are well defined and adaptable to the characteristics of different sites**

The PICCPMV aims at strengthening the capabilities of public and private institutions and the means of farmers to face climate change. It intends to make a number of innovative measures and actions known to partners and farmers in order to reinforce the adaptation of Moroccan agriculture to climate change. The project is unfolded to support ten projects Pillar II, in the regions of Gharb-Chrarda-Beni Hssen, Rabat-Salé-Zemmour-Zaër, Chaouia-Ouardigha, Doukkala-Abda et Tadla-Azilal.

The measures of climate change adaptation advocated as areas of intervention, although labeled and contextualized in terms of regions and sites are: (I) improved variety corps and certified seeds; (II) No-till Farming; (III) Modification of dates for No-till Farming and/or modification of No till Farming density (IV) Supplemental irrigation ; (V) Rainwater harvesting; (VI) Best practices in agriculture.

The illustration below shows the distribution of the ten subprojects PICCPMV over the identified five regions of the country



### Legend of the regions map

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>1. Tanger-Tétouan</li> <li>2. Taza-Al Hoceima-Taounate</li> <li>3. Gharb-Chrarda-Bni hssen</li> <li>4. Fes-Boulmen</li> <li>5. Oriental</li> <li>6. Rabat-Salé-Zemmour-Zaer</li> <li>7. Chaouia-Ouardigha</li> <li>8. Grand Casablanca</li> </ul> | <ul style="list-style-type: none"> <li>9. Meknes-Tafilalet</li> <li>10. Tadla-Azilal</li> <li>11. Doukkala- Abda</li> <li>12. Marrakech-Tensift-Al Haouz</li> <li>13. Sous-Massa-Darâa</li> <li>14. Guelmim-Es Smara</li> <li>15. Lâyoune-Boujdour-Sakia El Hamra</li> <li>16. Oued Ed Dahab-Lagouira</li> </ul> |
|--|--|

The PICCPMV, for a term of 5 years, was granted a fund by the Global Environment Facility through the World Bank.

The tangible support provided is basically articulated around field work, agricultural inputs technical assistance, training sessions and various forms of awareness and monitoring-evaluation actions, even though this support varies with the specific requirements of each of the ten deployment sites of the project.



## B.2. ENVIRONMENTAL AND CLIMATE CHANGE DIMENSIONS OF THE PROJECT

### **The predominance of the environmental dimension focused on the adaptation to climate change**

In our geographical and natural context, the degradation of natural resources and mostly agricultural land is due to combined effects of climate change and human activities carried out often on less fertile, poor in organic matter and highly fragile landscapes. Such situation which is significantly worsened by some inadequate cultural practices and the predominance of a degrading cereal production system (50 to 60% of utilized agriculture land), results, in many rural traditional based economy areas, into a regressive progress of landscape and a major deterioration of environment and natural vegetal plantations.

The precautionary management of water and land resources, with mainly a **greater diversification of land use and development of fruit farming in arid and sloppy areas to be reconverted from cereal agriculture**, is the required answer to face such situations of degradation. Therefore it's central to note that the fostered actions in this sense, by either Projects Pillar II or the PICCPMV, focus basically on the optimized usage of the two resources, becoming rare and crucial in rainfall agriculture : water and land.

The PICCPMV represents one of the first scale experiences of MAFM in terms of integrating the environment in agriculture and particularly in emphasizing its adaptation to climate change. The high complementary between the objectives of Project Pillar II and the PICCPMV is obvious mainly in fieldwork. The exercise consists of an open framework for the implementation of the PMV measures either in terms of solidarity based agriculture or the integration of its environmental scale.

In the practices set in place by the PICCPMV, reference had been made to the measures of the sixth directive of the PMV, entitled «Sustaining the development of Moroccan agriculture» which are founded on the following actions :

- The integration of the « Climate Change » scope into the conception of PMV projects,
- The Reconversion of nearly One Million ha of land cereals cultivated into fruit plantations,
- The experimentation of no-till farming for much broader usage,
- The promotion of water saving technologies in irrigation systems, and
- Support of the development and usage of renewable energies in farming (solar, wind power and biogas)

### **Actions are oriented towards the promotion of a conservation agriculture and focused on diverse farming rotation and no till farming**

The intervention of the PICCPMV had been guided by the major concerns about a broader diversification of land use, development of fruit farming and the promotion of no-till farming

In Morocco the cereal production system is predominant; cereals still cover 5 to 6 million ha which represents 60% of utilized agriculture area. The other speculations : fruit plantations, vegetables, industrial crops, vegetable cultivations and forage crops, each only covers a very insignificant portion, knowing that it still include nearly 20% to 25% of land laying fallow.

We acknowledge all the magnitude that is attached in this context to a more diversified crop rotation by mostly combating monoculture and cereal dominant farming, deemed to be erosive, especially in sloppy land.

The rationalization of land coverage and the use of land with respect to their characteristics are being set up increasingly as axes of intervention in the scope of integration of environment and adaptation of climate change.

*a. The programs of extending orchard landscapes have two essential objectives : diverse rotation and the conservation of soil and water*

A substantial effort has been undertaken for a broader extension of planted areas in favor of fruit farming all over the country. The objective set for 2020 is an ambitious one: The reconversion of a One Million ha of cereal plantations into orchard crops. The effort is starting to pay as between 2008 and 2013, the area planted had increased by 11% compared to the period between 2005 and 2007,

The harmony and the convergence of visions between the two projects Pillar II and PICCPMV, is more likely to maintain and further enhance the dynamics crop rotation reforms, incredibly strategic for the sustainability of agriculture and the adaptation to climate change.

**Underlying the development of fruit cultivations**, the PICCPMV acts on three categories of orchard cultivations that are : Olive, Almond and fig trees. The scope of intervention, though changing with regards to the characteristics of different regions, is defined as follows :

**For the category of olive and/or almond trees :**

- Rainwater harvesting – tailoring of benches and/ or of impluvium
- Best practices in agriculture (fertilization, phytosanitary treatment, till farming, etc.)
- Supplemental irrigation
- Training sessions for farmers.

**For the category of fig trees :**

- Amendment with vermin-compost
- Training sessions for farmers.

*b. No till farming as a measure for adaptation to climate change :*

The model of no till Farming is a technology (a package and a number of complementary actions), based on the introduction of the seed directly into the soil with zero till.

**For the promotion of no till farming system**, the PICCPMV recommends an intervention program on the overall parameters of the technical conduct of cereal farming, particularly :

- No till, improved varieties, certified seeds and early Seeding.
- Best practices in agriculture: fertilization, treatment, etc.
- Dozens of training sessions for farmers

With rotation and permanent soil cover, No-till farming is the third pillar of agriculture conservation or intensive ecological farming.

The technique of no-till farming is assisted by the use of herbicides for weed control in order to ensure "clean" fields before seeding.

Several experiments and attempts of introducing and progressively extending no-till farming technologies have been previously undertaken in Morocco. The agricultural suitable lands are also well defined and tangible results have been witnessed in a number of regions.

This technology is advocated as a privileged axe in the PICCPMV, considering a sound knowledge of the previously stated experience and the strategic importance and remarkable contribution of no till farming in facing climate change.



## C. IMPLEMENTATION APPROACH

### C.1. ORGANIZATION AND MENTORING

The assignments and the different responsibilities of any of the parties involved each had to be identified for the deployment of the project in the field.

In this organization as a whole, the communication of climate change adaptation measures to small holder farmers, in the targeted five regions and within the ten identified sub-projects is mandated by the regional agricultural authorities and its associated entities, meanwhile fostering awareness among institutions is assured by the ADA.

The ADA is in charge of the coordination of the project as a whole, in addition to its role as an interface and contact end with the different partners of the projects, mostly the World Bank, and along with sharing the different tasks of execution with the different entities of the MAFM involved in the implementation.

### C.2. A CLOSE SUPERVISION

#### A close supervision backed up with studies and workshops and meetings of exchange and follow up

Three important studies had been conducted by the project to carry its advancements and with respect to the sustainability of its outcomes and benefits; (I) no-till farming study (II) assessment study of the social component of the project and (III) assessment study of the technical and environmental component.

The preparation and presentation of these studies had been an opportunity to organize a series of workshops and an occasion for the different stakeholders to meet with the farmers.

During these meetings and workshops a growing acceptance of the project by the community had been observed as well as an increasing conviction of the relevance and the impact of the different fostered techniques and technologies on the future development of agriculture, the conservation oriented agriculture and climate change.

The workshop on no-till farming held on the 27th November 2013 in Settat had particularly the merit of drawing attention to the most emblematic and backing components of the project. Several participants had affirmed that this workshop had a resounding success. It was an opportunity to assess to what extent the various stakeholders, as well as the local authorities rely on this technology, perceived by all as one of the most effective answers to climate change. The mobilization for the workshop which opening was presided by the Wali of Settat was a remarkable one.

The various common features between these different workshops and assemblies all express the expending interest of the different stakeholders. Particularly the significant number of farmers who had been taking part in these events and the exceptional quality of debates and interventions of the different partners as well as the role INRA in the moderation of the different assemblies.



## D. OUTCOMES AND BENEFITS

### D.1. CEREAL DEVELOPMENT AND NO TILL FARMING SYSTEM PROMOTION

#### **Firm advances and work field outcomes that are probate and crucial in situations of drought.**

The crop year of 2013/2014, which was characterized by an intensive drought compared to other farming years since the start of this program, had particularly highlighted the scale of no till farming in the adaptation to climate change.

The crop year which had placed a considerable strain on the promoted actions by the PICCPMV, had witnessed a consequent mobilization of mentoring, close supervision, and several field visits mostly to the no till farming fields during harvesting times in order to review and appreciate the results obtained with no till farming as opposed to the traditional one.

The field visits had been an occasion not just to review the results and performance of no till farming during drought years, but also a mean to provide information about the attitude and perceptions of farmers and the procedures set in place by the different stakeholder for the fostering of this new added value system.

In fact the comparison in this crop year of either the vegetative state or the crop yields in detached fields had undoubtedly confirmed the success of no till farming; recording significant positive variances as opposed to the traditional farming.

**It is worth mentioning in particular**, the increase of 15% to 20% in crop yields in the treated plots compared to classic seeding especially in drought years as well as the extension of planted areas using no till farming techniques inclusive of the program planned initially. Various other indicators emphasizes the positive impact of no till farming mainly : (I) The major improvement of soil agronomic features (texture, structure and fertility); (II) The improvement of water budgets in plots; (III) The improvement of degree of resistance of cultivations to the biotic and abiotic stress; (IV) Imitation of wind erosion, and ; (V) The decrease of tractor-trailers crossings for seedbed preparation; etc.

**In fact the no till farming translates into a consequent saving of energy used and therefore an important restriction of gas emission and air pollution, in addition to an increase in the depreciation age of agricultural machinery.**

Today, with the obtained input and results from the PICCPMV, the placement of no till farming on the list of priorities is well defensible, making the most of the different products and tools developed by the project with the aim of motivating and simulating the interest of farmers to turn to this practice where it is fully justified as part of the PMV.

The following image, taken in the region of Settat, illustrates the comparison of the vegetative state of two fields and showcasing the advantage of no till farming.



## D.2. AXE OF ORCHARD CROPS IN SLOPPY AREAS

### A clear relevance in conservation of water and soil

The program of extension of landscape of orchard crops aspire at two crucial objectives which are : (I) The diversification of rotations and (II) The conservation of water and soil, orchard farming being set as the most efficient approach to diversify the cultivation systems.

The contribution of the project in favor of fruit farming is imminent from two different itineraries; the creation of new orchards and the rehabilitation of existing ones, for the concerned categories of almond, olive, and fig trees. The results acquired from the two itineraries are overall positive on a number of respects. The vigorous plantations, of those newly created and those rehabilitated, stands for a success indicator. The simplest illustration is the tailoring of benches and or of impluvium that showcases a clear difference from the cases that are not considered. The success is obvious as well as in :

- The improvement of soil fertility;
- The improvement of water budgets in plots especially in sloppy areas;
- The improvement of the potential of crops yields with a stabilized production;
- The restriction of hybrid

To demonstrate what we could expect from the quality of vigorous orchards in sloppy areas in terms of soil and water conversion, **the image below**, photographed in the region of Azifal illustrates the results of a rehabilitation treatment.



### D.3. ACHEIVEMENT IN TERMS OF INTERVENTION MEASURES

#### **Another momentous outcome : a useful experience in terms of product management of such scope and nature**

Another comprehensive outcome of the project consists of a valuable professional experience in terms of the integration of environment in agriculture and the mastering of climate change adaptation technologies.

On one hand the project, taking into consideration its innovative nature, involves inevitably some new actions and performances, which is not likely to help in its management and on the other hand the implementation of this project was dependent on two distinct financial sources, the funds contribution and national budget, which had engaged diverse realization procedures.

The management of such situations, combined with other circumstances, mostly of a climatic nature, shows the significance of close supervising, coordination, restructuring, the readjustment and often scheduling and review of the completion dates that the carried out activities in this project had frequently generated.

The PICCPMV which was not just perceived as an introduction framework for pilot projects, carefully considered and designed, but as a framework for building, testing solutions and mortgage origination ready to be duplicated and reproduced while being adapted to the conditions of different regions and sites.

The professional experience generated by the project is of benefit not only to the administrative and technical apparatus of the MAFM, involved in the implementation of this project, but also to the private sector through the technical assistance and performance associated tasks and the civil society, which is organized under this project in cooperatives and associations with an environmental focus.

### E. REQUIREMENTS OF SUSTAINILITY AND OFFERED POSSIBILITIES

#### **Promissing and emerging signs with suitable conditions for sustaining the benefits of the project**

The achievements of the project and the substantial benefits, the qualitative and quantitative ones that have been accomplished are to be considered as a phase in a long term process of fostering conservation agriculture in the country.

The sustainability of the benefits of a project and the possibility to extend and enlarge it in the future, relies generally on two essential pillars that are the relevance of the promoted actions and the measures undertaken by the institutions in charge of their follow up.

Various achievements and results emerging from this project can be effectively exploited for sustaining the income of the project and for enlarging its scope of influence.

- We could claim that the project has the merit of subscribing the conservative management of lands in the current concerns and making a major step in its dissemination to not just farmers but all the involved institutions and organization.  
As stated by various partners, the series of exchange meetings, raising awareness and sharing of outcomes, which have marked the conduct of this project, did not miss out on stressing on the importance that is attached henceforth to a greater engagement for conservation agriculture.



- The implementation of the PICCPMV had provided as well a number of outreach tools and enabled to develop the required arguments and therefore reinforce the intervention means for promoting, on a larger scale, production systems that are oriented towards soil and water conservation and towards more specific practices such as no till farming.
- In addition, the achievements acquired in fieldwork are likely to better illustrate the accomplished success and to serve as an educational support to programs of outreach and development of conservation agriculture. The experiences carried out can be effectively used as a frame of showcases and communication with the largest possible number of farmers and concerned actors.
- The different documents generated are to be regarded as references and sources of development of different means of communication about the technologies advocated by the project. The study about no till farming, conducted in the highlight of this project, provides a number of convincing aspects in favor of this production system. This study had enabled to have a ROAD MAP for the process of promoting no till farming in our national climatic and geographical context.
- Signs of substantial engagement from partners in favor of the technologies promoted by the project had begun to show and to get confirmed, and they are likely to enhance the conditions for its sustainability. The most illustrating aspects are not just the acquisition of seeds drill and other associated equipment by the MAFM, but all the weight given hereafter by INRA to the orchard cultivation and no drill farming in its carried out activities and programs.

The next step, amongst others, should be the elaboration of a larger scale communication program to which a number of actors and institutions could contribute, especially the central, regional, provincial and local offices of the MAFM. The aim is to reach a decisive engagement to larger introduction of conservation of natural resources in production systems.

## **Annex 8. Comments of Cofinanciers and Other Partners/Stakeholders**

n/a

## **Annex 9. List of Supporting Documents**

Agence de Développement Agricole, 2015, Rapport d’Achèvement du Projet PICCPMV

FAO, 2013, Climate Smart Agriculture Sourcebook.

World Bank, 2009, Morocco study on the impact of climate change on the agricultural sector: René Gommès, FAO/NRC Tarik El Hairech, DMN Damien Rosillon, consultant Riad Balaghi, INRA Hideki Kanamaru, FAO/NRC