

Kingdom of Morocco

FY2017 Ex-Post Evaluation of Japanese ODA Loan  
“Watershed Management Project”

External Evaluator: Maki Hamaoka  
Foundation for Advanced Studies on International Development

## 0. Summary

The objective of this project was to restore degraded lands and improve the livelihood of the local population by carrying out afforestation and livelihood improvement activities in Oued Mellah Watershed in the regions of Chaouia Ourdigha (hereinafter called “OM Watershed”) and Allal El Fassi Dam Upper Watershed in the region of Fès-Boulemane (hereinafter called “AEF Dam Upper Watershed”), thereby contributing to natural resources conservation and to poverty alleviation of the local population in the above two regions.

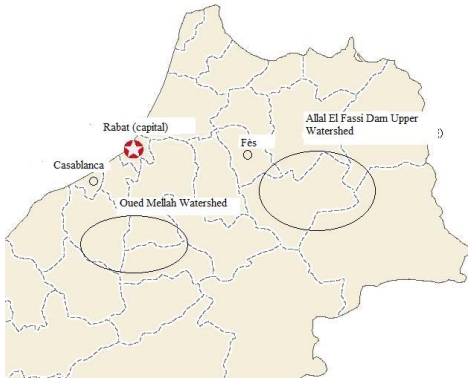
The project has been highly relevant to the development plan and development needs of Morocco, as well as Japan’s ODA policy; therefore its relevance is high. Among the three operation and effect indicators, those of afforestation area and quantity of planting achieved their target values sufficiently. The actual value of the survival ratio after planting was greatly different from year to year. In the year when the survival ratio was low, external factors such as the influence of exceptional drought greatly affected the survival ratio after planting. In this regard, the achievement degree was judged to be fair. Positive impacts were recognized such as an increase in income and diversification of income sources brought by the livelihood improvement activities and a decrease in the quantity of forest resources collected and illegal logging as a result of change in consciousness of the local population through awareness-raising activities and livelihood improvement activities. No negative impact on the natural environment was observed and there was no resettlement. Among the operation and effect indicators, those of afforestation area and quantity of planting indicate the achievement result at a certain “point” whereas the survival ratio after planting indicates the degree of afforestation after a certain “period”. In this ex-post evaluation, as a result of placing importance on the survival ratio after planting, the effectiveness/impact was judged to be fair. Although the project cost was within the plan, the project period slightly exceeded the plan; therefore the efficiency of the project is fair. In sustainability, with regard to the institutional/organizational aspects, the organizational structure of the executing agency, the Haut Commissariat for Water and Forest and Combating Desertification (hereinafter called “HCEFLCD”<sup>1</sup>) is maintained at central, regional and provincial levels from the appraisal to the ex-post evaluation. In technical aspects, the executing agency conducts monitoring after afforestation, and maintenance of check dams and filter fences without problems. There is no problem in financial aspects. Therefore, sustainability of the project effects is high.

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<sup>1</sup> Haut Commissariat aux Eaux et Forêts et à la Lutte Contre la Désertification

In light of the above, this project is evaluated to be satisfactory.

## 1. Project Description



Forest improved by the Project  
(Benslimane Province  
in the OM Watershed, Thuja)

### 1.1 Background

In Morocco, where territory is situated in arid and semi-arid zones, forest degradation was equivalent to 30,000 hectares annually, whereas the total forest area of the country was 9 million hectares<sup>2</sup>. Land degradation is caused mainly by climate change and human pressure such as overgrazing. The forest degradation caused soil erosion and degradation, as well as degraded water and soil conservation functions of lands. Although the government of the Kingdom of Morocco has implemented afforestation and dam construction, the forest degradation is one of the causes of floods in urban area in the downstream. In recent years especially, sudden heavy rains have occurred frequently, causing frequent floods in urban areas downstream. Not only physical damage but also loss of human life has become a problem along with the progress of urbanization. In Morocco, since the rainfall is low throughout the year and human pressure such as overgrazing is high, once natural recovery capacity is lost, it becomes very difficult to restore lost forest naturally. The government of the Kingdom of Morocco considers forest conservation and water and soil protection as urgent issues.

### 1.2 Project Outline

The objective of this project was to restore degraded land and improve the livelihood of the local population by carrying out integrated watershed conservation activities such as afforestation and livelihood improvement activities of the local population in the OM Watershed in the region of Chaouia Ourdigha and AEF Dam Upper Watershed in the region of Fès-Boulemane, thereby contributing to natural resources conservation and to poverty alleviation in the above two regions.

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<sup>2</sup> Data provided by the government of Morocco at the time of the appraisal (document provided by JICA).

Loan Approved Amount/ Disbursed Amount	3,165 million yen/1,793 million yen																								
Exchange of Notes Date/ Loan Agreement Signing Date	March 2007/March 2007																								
Terms and Conditions	Interest Rate 0.75% Repayment Period 40 years (Grace Period) (10 years) Conditions for Procurement General Untied																								
Borrower / Executing Agency	Government of the Kingdom of Morocco/ HCEFLCD																								
Project Completion	December 2014																								
Main Contractor(s) (Over 1 billion yen)	Vakakis International S.A. (Greece)																								
Related Studies (Feasibility Studies, etc.)	Kingdom of Morocco “Special Assistance for Project Formulation for the Watershed Management Project” (JICA, November 2006)																								
Related Projects	Watershed management projects by other organizations <table border="1"> <thead> <tr> <th>Watershed</th> <th>Area (km<sup>2</sup>)</th> <th>Organization</th> </tr> </thead> <tbody> <tr> <td>Mohamed V</td> <td>49,920</td> <td>EU</td> </tr> <tr> <td>Ouahda</td> <td>6,153</td> <td>EU</td> </tr> <tr> <td>Hassan I</td> <td>1,670</td> <td>IBRD</td> </tr> <tr> <td>Moulay Youssef</td> <td>1,441</td> <td>UNDP, FAO</td> </tr> <tr> <td>Idriss I</td> <td>3,680</td> <td>AFD</td> </tr> <tr> <td>Aoulouz</td> <td>4,500</td> <td>AFD</td> </tr> <tr> <td>Nakhla</td> <td>107</td> <td>USAID</td> </tr> </tbody> </table>	Watershed	Area (km <sup>2</sup> )	Organization	Mohamed V	49,920	EU	Ouahda	6,153	EU	Hassan I	1,670	IBRD	Moulay Youssef	1,441	UNDP, FAO	Idriss I	3,680	AFD	Aoulouz	4,500	AFD	Nakhla	107	USAID
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## 2. Outline of the Evaluation Study

### 2.1 External Evaluator

Maki Hamaoka, Foundation for Advanced Studies on International Development

### 2.2 Duration of Evaluation Study

This ex-post evaluation study was conducted with the following schedule.

Duration of the Study: September 2017 - December 2018

Duration of the Field Study: January 7- 19, 2018, April 22 - 26, 2018

### 2.3 Constraints during the Evaluation Study

The operation and effect indicators and the target values of the outputs of this project were revised at the time of the mid-term review in 2011. At this time, the extension of the project activities was not decided and the target year of the operation and effect indicators was 2015, two years after the planned project completion. However, despite the fact that the operation and effect indicators on afforestation area and quantity of planting<sup>3</sup> reached their target values in the

<sup>3</sup> Since the data on the survival ratio of one year after planting is only available as data on the survival ratio after

OM Watershed in 2012 and in the AEF Dam Upper Watershed in 2013, their target values were not revised. In addition, when the one-year extension of the activities was decided from December 2013 to December 2014, the revision of the target values to be achieved two years after the project completion year, namely 2016, was not conducted.

Since it was difficult to assume target values from interviews with concerned parties or information obtained from existing documents in this ex-post evaluation and there were no alternative data, the target values revised in 2011 to be targeted for 2013 and the actual result at the time of the project completion (2014) were compared in comparing the planned and actual results in efficiency. In evaluating effectiveness, the target values revised in 2011, for which the target year was 2015, and the actual result as of 2016 were compared.

### **3. Results of the Evaluation (Overall Rating: B<sup>4</sup>)**

#### **3.1 Relevance (Rating: ③<sup>5</sup>)**

##### **3.1.1 Consistency with the Development Plan of Morocco**

The government of the Kingdom of Morocco placed high priority on watershed management at the time of the project appraisal. It formulated the “National Forest Program” (1998-2020) as the top strategy of the forest management policy, which set out a comprehensive strategy centered on “forest management as national property,” “development around forest areas,” “participatory approach for regional development” and “strengthening partnerships.” As an implementation plan in line with these strategies, the “National Watershed Management Plan” (1996) (hereinafter referred to as “PNABV”<sup>6</sup>) was formulated. The PNABV planned watershed management of approximately 1.5 million hectares in the 20-year period out of 10 million hectares of watershed with heavy erosion damage. The AEF Dam Upper Watershed and the OM Watershed, target watersheds of this project, were positioned in 7<sup>th</sup> and 22<sup>nd</sup> places respectively in the priority order of 22 target watersheds of the PNABV.

The government of the Kingdom of Morocco placed high priority on the watershed management at the time of the ex-post evaluation. Since the PNABV formulated in 1996 covered only 50% of the target area in 20 years, the result of the PNABV was reviewed and a concrete program has been formulated as the second phase of PNABV from 2016 to 2018 with a view to strengthening further watershed management. Moreover, “Law 113-13 on Pastoral Transhumance and Management and Development of Pastoral Spaces”<sup>7</sup> was enacted in March 2016. The law sets out the basic principles and general rules on management of pastoral and sylvopastoral areas, use and development of pastoral resources, and pastoral transhumance and

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planting, the operation and effect of the project is evaluated in a limited range / time mainly from the operational status.

<sup>4</sup> A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

<sup>5</sup> ③: High, ②: Fair, ①: Low.

<sup>6</sup> Plan National d'Aménagement des Bassins Versants.

<sup>7</sup> Loi sur la Transhumance Pastorale et la Gestion et l'Aménagement des Espaces Pastoraux 113-13.

livestock mobility. The above law was enacted due to the fact that in Morocco, where rainfall is low (including the project area), together with the recent prolonged drought, overgrazing was the impetus to maintain forest resources and that institutional strengthening was an urgent issue.

As mentioned above, at the times of the appraisal and ex-post evaluation, the objectives of the project aiming at restoring degraded land and improving the livelihood of the local population by comprehensive watershed conservation activities were highly consistent with the national development plan of Morocco.

### 3.1.2 Consistency with the Development Needs of Morocco

#### (1) Trends in Forest Area

At the time of the project appraisal, the forest area of Morocco was 5,401 thousand hectares, which was increasing year by year. The forest area is 5,632 thousand hectares at the time of the ex-post evaluation, which increased from the time of the project appraisal, but it has been decreasing since 2010, looking at the annual change of forest area. The decline of the forest area is caused by climate change including long-term drought, collection of firewood by the local population (three to four times of potential), overgrazing (two to five times of potential), expansion of cultivated land and urbanization<sup>8</sup>.

Table 1. Trends in Forest Area in Morocco

Year	Forest area (1000 hectares)					Annual change of forest area (1000 hectares/year)					
	1990	2000	2005	2010	2015	1990–2000	%	2000–2010	%	2010-2015	%
Area (1000 hectares)	4,954	4,993	5,401	5,672	5,632	3.9	0.1	1.3	1.3	-8	-0.1

Note: The above-mentioned forest area is based on the definition of the Food and Agriculture Organization (FAO) of the United Nations. Source: Evaluation des ressources forestières mondiales 2015, rapport national, Maroc (2014).

#### (2) Occurrence of Floods

At the time of the project appraisal, the decline of the forest area caused soil erosion and deteriorated the water and soil conservation function of the land, becoming one of the causes of the flooding in the downstream urban areas. Among them, the large flood that occurred in the lower area of the OM Watershed in 2002 caused 63 deaths and large-scale damage, such as house inundation and disruption of roads in Mohammedia City and Berchid City. According to the interview survey conducted in Boulemane Province in the AEF Dam Upper Watershed at the time of the ex-post evaluation, the need for watershed management was recognized. The occurrence of damage to agricultural lands and livestock due to floods was reported where afforestation and installation of check dams and filter fences were not implemented, and afforestation and installation of check dams and filter fences for watershed conservation were

<sup>8</sup> Evaluation des ressources forestières mondiales 2015, rapport national, Maroc (2014).

requested by the local population for places without afforestation and installation of check dams and filter fences.

### (3) Poverty Incidence

The poverty incidence was 16.8% on average in the targeted eight rural communes of the OM Watershed and 24.0% on average in the 12 targeted rural communes in the AEF Dam Upper Watershed at the time of the project appraisal. At the time of the ex-post evaluation, the poverty incidence is 9.5% on average in rural areas and 1.6% on average in urban areas in Morocco<sup>9</sup>. Rural poverty incidence is significantly higher than urban poverty incidence. At the time of the ex-post evaluation, the poverty incidence is 7.6% on average in the OM Watershed and 11.1% on average in the AEF Dam Upper Watershed. At the time of the ex-post evaluation, compared to the time of the project appraisal, the poverty incidence of six out of eight rural communes in the OM Watershed and three out of 12 rural communes in the AEF Dam Upper Watershed are lower than the average of the rural poverty incidence (9.5%). Although the poverty incidence improved in most of the target rural communes, the need for further livelihood improvement is recognized in around half of the target rural communes.

Table 2. Poverty Incidence in the Project Area

OM Watershed						
Province		Rural Commune	2005* <sup>1</sup>		2014* <sup>2</sup>	
			Poverty incidence (%)	Population	Poverty incidence (%)	Population
Khouribga	1	Lagnadi	19.3	7,338	15.0	7,227
Benslimane	2	Ahlaf	19.8	12,841	4.7	11,451
	3	Mellila	18.9	14,257	4.6	15,081
Settat	4	Lakhzazra	13.7	8,673	6.1	8,582
	5	M'Garto	12.5	8,827	2.3	8,514
	6	Ouled Cebbah	13	8,367	2.5	7,606
	7	Ouled M'Hamed	22	10,844	21.4	10,187
	8	Sidi Dahbi	14.9	7,925	4.0	8,703
		Total		79,072		77,351
		Average	16.8		7.6	
AEF Dam Upper Watershed						
Boulemane	1	Talzemt	29.0	3,710	10.6	3,160
	2	Ait Bazza	32.6	3,480	13.7	2,955
	3	Ait El Mane	27.4	2,243	12.0	1,927
	4	El Mers	31.4	5,891	10.7	5,152
	5	Sekoura	27.4	8,713	13.3	8,462
	6	Gguigou	47.2	7,976	14.4	21,607
Sefrou	7	Ighzrane	17.9	1,150	9.2	9,626
	8	Oulad Mkoudou	18.9	7,821	4.1	6,667
	9	Dar El Hamra	10.5	4,022	11.9	4,018
	10	Tafajight	10.1	2,047	13.7	1,697
	11	Adrej	14.2	2,236	8.9	1,709
	12	Tazouta	20.8	5,745	11.1	1,354
		Total		55,034		68,334
		Average	24.0		11.1	

Note: Gray shaded rural communes are those below the national average of rural poverty incidence.

Source: \*1 Pauvreté, développement humain et développement social au Maroc, Haut Commissariat du Plan (2005). \*2 Carte de la pauvreté communale 2014 (2014).

<sup>9</sup> Haut-Commissariat au Plan et la Banque Mondiale (2017).

At the times of both the appraisal and ex-post evaluation, the objectives and approach of the project were in line with the development needs of Morocco.

### 3.1.3 Consistency with Japan's ODA Policy

At the time of the project appraisal, the "Medium-Term Strategy for Overseas Cooperation Operations" (2005-2007) of JICA focused on "assistance for poverty reduction" and "assistance for global issues and peacekeeping" as overall priority areas. The assistance policy for Morocco included "measures to environmental problems" as a priority area. The "Country Assistance Implementation Policy" (2006) of JICA focused on the importance of afforestation from the viewpoint of addressing environmental problems and water resources management. It stated assistance for comprehensive protection and recovery of forest resources as measures against forest degradation, soil erosion, and desertification caused by deforestation and overgrazing.

In the light of the above, this project has been highly relevant to Morocco's development plan, development needs, as well as to Japan's ODA policy; therefore its relevance is high.

## 3.2 Efficiency (Rating: ②)

### 3.2.1 Project Outputs

The project outputs consisted of six components: (1) reconstruction of degraded forest ecosystem, (2) grazing and cultivated lands improvement, (3) treatment of lands affected by rill and gully erosion, (4) forest infrastructure improvement, (5) local population livelihood improvement and (6) equipment for institutional strengthening.

#### (1) Component 1: Reconstruction of Degraded Forest Ecosystem

This component is mainly composed of such activities as assisted regeneration<sup>10</sup> and afforestation for protection<sup>11</sup>. As shown in Table 3, all activities were carried out as planned.

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<sup>10</sup> Reproductive planting of tree species in each target forest, which is the main constituent species of forest for regeneration (documents provided by JICA).

<sup>11</sup> Afforestation to increase the permeability of water to soil by increasing vegetation cover in forest where devastation has progressed and alleviating soil erosion due to rainwater. Planting is done at a relatively high density. For the high density planting, items 1-5 in Table 3, the staircase work and the stone framework were constructed along the contour line in the site where the trees are planted (documents provided by JICA).

Table 3. Result of Component 1: Reconstruction of Degraded Forest Ecosystem (accumulation)

	Unit	Target	Result						
			2008	2009	2010	2011	2012	2013	2014
1-1 Assisted regeneration									
OM Watershed	ha	1,200	200	400	850	1,150	1,350	1,350	1,450
AEF Dam Upper Watershed	ha	1,879	100	250	450	1,150	1,800	2,200	2,406
Total	ha	3,079	300	650	1,300	2,300	3,150	3,550	3,856
1-2 Afforestation for protection									
OM Watershed	ha	2,690	270	820	870	1,390	1,890	2,390	2,610
AEF Dam Upper Watershed	ha	3,675	500	1,100	1,600	2,400	3,100	3,850	3,950
Total	ha	6,365	770	1,920	2,470	3,790	4,990	6,240	6,560
1-3 Tending of plantation									
OM Watershed	ha	n.a.	600	1,240	2,140	2,740	3,620	4,250	4,960
AEF Dam Upper Watershed	ha	n.a.	700	900	1,550	2,400	3,220	3,920	3,920
Total	ha	9,358	1,300	2,140	3,690	5,140	6,840	8,170	8,880
1-4 Sylvicultural works (AEF Dam Upper Watershed only)	ha	1,372	0	223	523	775	1,225	1,325	1,925
1-5 High density plantations (OM Watershed only)	ha	300	0	100	300	300	300	300	300
1-6 Forest management study	ha	40,000	0	37,847	37,847	37,847	59,237	59,237	59,237

Note: The target value is the value revised at the time of mid-term review in 2011. Source: HCEFLCD.

## (2) Component 2: Grazing and Cultivated Lands Improvement

In Morocco, overgrazing is a major cause of the deforestation. This component was implemented to improve productivity of grazing lands and to suppress overgrazing in forests. For grazing lands improvement, the following were implemented as planned: 1) sylvopastoral plantations<sup>12</sup> and 2) regeneration of natural grazing lands<sup>13</sup>, and for cultivated lands improvement, 3) fruit tree plantation<sup>14</sup>, 4) soil improvement<sup>15</sup>, and 5) hydro-agricultural management.

<sup>12</sup> Grasses were planted with reduced crown density by tree thinning so that plants can grow in closed forests. In the forestland with low crown density, trees for manure were planted and grazing lands were sowed in order to improve the productivity of livestock fodder. These activities were implemented after consultation with local residents with rights to grazing in the area (documents provided by JICA).

<sup>13</sup> Regeneration of natural grazing lands, unlike the sylvopastoral plantations, was implemented by placing a guard for a certain period of time to prevent livestock invasion. In the devastated natural grazing lands, regeneration was assisted by fertilization and seeding. The project planned to decide on a grazing ban period through consultation with local residents who have the right to grazing, considering the situation of the grazing lands (documents provided by JICA).

<sup>14</sup> Fruit trees such as olives, almonds and figs were planted according to the geographical conditions and the intention of the landowners for the purpose of increasing the vegetation covering and allowing landowners to earn income from the fruits (documents provided by JICA).

<sup>15</sup> Work to improve the agricultural productivity of the land by removing stones from the ground and then constructing masonry along the contour lines (documents provided by JICA).



Table 4. Result of Component 2: Grazing and Cultivated Lands Improvement (accumulation)

	Unit	Target	Result						
			2008	2009	2010	2011	2012	2013	2014
<b>2-1 Sylvopastoral plantations</b>									
OM Watershed	ha	984	0	400	550	780	1,030	1,260	1,260
AEF Dam Upper Watershed	ha	2,255	200	500	800	1,240	1,390	1,390	1,390
Total	ha	3,239	200	900	1,350	2,020	2,420	2,650	2,650
<b>2-2 Regeneration of natural grazing lands</b>									
OM Watershed	ha	2,748	500	1,300	1,988	2,288	2,438	2,448	2,748
AEF Dam Upper Watershed	ha	1,512	0	0	0	385	675	725	875
Total	ha	4,260	500	1,300	1,988	2,673	3,113	3,173	3,623
<b>2-3 Fruit tress plantation</b>									
OM Watershed	ha	n.a.	205	605	725	1,145	1,515	1,655	1,810
AEF Dam Upper Watershed	ha	n.a.	200	800	1,250	1,750	2,050	2,500	2,700
Total	ha	4,600	405	1,405	1,975	2,895	3,565	4,155	4,510
<b>2-4 Soil improvement (AEF Dam Upper Watershed)</b>									
	ha	471	25	75	125	165	305	465	505
<b>2-5 Hydro-agricultural management (AEF Dam Upper Watershed)</b>									
	site	6	1	3	4	5	6	7	7

Source: HCEFLCD.

## (3) Component 3: Treatment of Lands Affected by Rill and Gully Erosion

In this component, in order to suppress the outflow speed in places where there are no plants on a steep slope and where there is a lot of outflow of the surface soil, the following were implemented: 1) mechanical treatment (installation of check dams and filter fences); 2) maintenance/rehabilitation of check dams; and 3) biological treatment (afforestation around the check dams/fences). The actual result of mechanical treatment greatly exceeded the plan, since the mechanical treatment was highly appreciated by the local population and was implemented according to their requests on private lands that were not planned. The actual result of the maintenance/rehabilitation of check dams and filter fences was less than the plan due to the fact that the number of check dams and filter fences to be maintained decreased in the latter half of the project. As the quality of construction improved, the number of check dams and filter fences to be maintained decreased compared to the plan. The actual result of biological treatment was lower than the plan in the AEF Dam Upper Watershed due to the delay in construction caused by difficulty in selecting contractors.

Table 5. Result of Component 3: Treatment of Lands Affected by Rill and Gully Erosion (accumulation)

	Unit	Target	Result						
			2008	2009	2010	2011	2012	2013	2014
<b>3-1 Installation of check dams and filter fences</b>									
OM Watershed	m <sup>3</sup>	20,000	2,400	4,400	8,220	12,570	15,100	18,500	21,300
AEF Dam Upper Watershed	m <sup>3</sup>	29,100	3,100	6,500	10,500	17,500	23,500	37,395	41,486
Total	m <sup>3</sup>	49,100	5,500	10,900	18,720	30,070	38,600	55,895	62,786
<b>3-2 Maintenance/rehabilitation of check dams and filter fences</b>									
OM Watershed	site	800	0	170	406	541	841	841	841
AEF Dam Upper Watershed	site	755	0	70	70	159	159	264	264
Total	site	1,555	0	70	240	565	700	1,105	1,105
<b>3-3 Biological treatment</b>									
OM Watershed	ha	780	95	190	230	390	600	760	920
AEF Dam Upper Watershed	ha	430	0	0	5	90	175	275	355
Total	ha	1,210	95	190	235	480	775	1,035	1,275

Source: HCEFLCD.

#### (4) Component 4: Forest Infrastructure Improvement

This component was composed of 1) nurseries improvement/production of seedlings and 2) infrastructure of forest protection. The nurseries improvement and production of seedlings included production of seedlings, installation of irrigation facilities, light shielding nets and weather observation stations. The actual results of the nurseries improvement/production of seedlings exceeded the plan. The actual result of the production of seedlings was lower than the plan. The difference between the plan and the actual result was that the seedlings did not grow in the first half of the project because the seedlings were damaged during transportation due to inconsistency in the specifications of the rack for transportation. Another reason was because the number of seedlings to be produced was decided based on the afforestation plan of the next year and the actual required number decreased from the planned number.

In the infrastructure of forest protection, construction and maintenance of forest roads, maintenance of forest firebreaks (maintenance by reaping weeds and miscellaneous trees to protect plantation area from forest fires), and construction and maintenance of forest offices were implemented as planned. The actual result of construction and maintenance of forest roads and forest offices exceeded the plan as a result of implementation according to the needs. The actual result of maintenance of forest firebreaks was lower than the plan, because there was less need than expected.

Table 6. Result of Component 4: Forest Infrastructure Improvement (accumulation)

	Unit	Target	Result						
			2008	2009	2010	2011	2012	2013	2014
4-1 Nurseries									
4-1-1 Nurseries improvement									
OM Watershed	site	2	2	2	2	2	2	2	2
AEF Dam Upper Watershed	site	2	2	2	2	2	2	3	3
Total	site	4	4	4	4	4	4	5	5
4-1-2 Production of seedlings									
OM Watershed	plant	7,203,900	0	2,550,000	4,187,900	5,647,900	6,692,900	7,440,577	7,754,377
AEF Dam Upper Watershed	plant	8,912,000	1,100,000	1,930,000	3,050,000	4,484,750	5,184,750	5,184,750	5,939,750
Total	plant	16,115,900	1,100,000	4,480,000	7,237,900	10,132,650	11,877,650	12,625,327	13,694,127
4-2 Infrastructures for forest protection									
4-2-1&4-2-2 Construction/Maintenance of forest road (total of the two target watersheds)									
	km	335	41	103	146	222	274	365	381
4-2-3 Maintenance of forest firebreaks									
OM Watershed	site	8,400	400	600	1,600	2,400	6,400	10,400	14,400
AEF Dam Upper Watershed	site	26,800	2,500	2,500	6,000	6,000	7,000	7,000	7,000
Total	site	35,200	2,900	3,100	7,600	8,400	13,400	17,400	21,400
4-3 Forest office installations									
4-3-1 Construction of forest offices									
	site	2	2	2	2	2	2	2	2
4-3-2 Maintenance of forest offices									
OM Watershed	site	20	6	11	15	19	21	25	27
AEF Dam Upper Watershed	site	18	10	19	19	19	24	24	24
Total	site	38	16	30	34	38	45	49	51

Source: HCEFLCD.

#### (5) Component 5: Local Population Livelihood Improvement

This component consisted of the formulation and implementation of the Plan of Development of Social Territorial Unit (*Plan de Développement de Unités Socio-Territoriales*,

herein after called “PDUST”)<sup>16</sup> and the fish breeding study on the dam lake. The PDUST was formulated and implemented for the livelihood improvement of the local population and the living environment infrastructure development that complemented the forest conservation activities. The actual result of the number of rural communes which formulated and implemented the PDUST was 28 rural communes (nine in the OM Watershed and 19 in the AEF Dam Upper Watershed) as of 2014, against the planned 27 rural communes (eight in the OM Watershed and 19 in the AEF Dam Upper Watershed; target year was 2013). The fish breeding study on the dam lake was conducted as planned.

Table 7. Result of Component 7: Implementation of PDUST

Item	Number
Apiculture	21
Agricultural training	15
Construction/maintenance of roads	14
Fruit trees plantation (olive, almond, etc.)	12
Construction/rehabilitation of water points	12
Construction/rehabilitation of small-scale irrigation	6
Distribution of seeds of saffron	2
Improvement of lands	1
Total	83

Note: Since one organization developed and implemented multiple plans, the total number of items exceeds the total number of rural communes. Source: HCEFLCD.

#### (6) Component 6: Equipment for Institutional Strengthening

Vehicles and trucks (21 units), computer-related equipment (37 computers, three units of computer-related equipment including software), and audio-visual equipment (20 units) were purchased as planned.



Check dams constructed by the Project (AEF Dam Upper Watershed, Sefrou Province)



Nurseries improved through the Project (OM Watershed, Ben Slimane Province)

<sup>16</sup> At the beginning of the project, the name was PDD (*Plan de Développement des Douars* [village development plan]). In practice, since the plan was not formulated and implemented in a unit of one village (*douar*), but in a wider range of social territorial units (Unités Socio-Territoriales), the name was replaced by PDUST (*Plan de Développement de Unités Socio-Territoriales*; Social Territorial Unit Development Plan) in 2009. The contents being implemented are the same; PDUST was used in this report.

### 3.2.2 Project Inputs

#### 3.2.2.1 Project Cost

With regard to the project cost, since the data on administration costs and price escalation were not obtained at the time of the ex-post evaluation, the planned and actual project costs were compared by deducting those unavailable costs from the planned project cost. The actual project cost amounted to 2,249 million yen against the planned project cost of 3,596 million yen (equivalent to 63% of the planned project cost), which was within the plan (Table 8). The difference between the planned and the actual project cost was due to the fact that the unit cost was lower than the original estimate in the bid for selection of consultants to be engaged in the consulting services due to the influence of competition principle and the exchange rate fluctuation<sup>17</sup>. Additionally, compensation for the grazing ban was not expended in the OM Watershed due to the residents' disagreement.

Table 8. Planned and Actual Project Cost

Item	Unit: Million yen	
	Plan	Actual
1. Forest Conservation Activities	2,686	1,717
Reconstruction of degraded forest ecosystem	1,115	624
Grazing and cultivated lands improvement	434	237
Treatment of lands affected by rill and gully erosion	271	215
Forest infrastructure improvement	560	417
Local population livelihood improvement	209	153
Equipment for institutional strengthening	97	73
2. Price escalation	497	N.A.
3. Physical contingency	159	0
4. Consulting Services	156	75
5. Administration Costs	129	N.A.
6. Taxes and Duties	426	404
7. Compensation for grazing ban	169	51
8. Lifting charge		2
Total	4,222	2,249
Total excluding Item 2 and 5	3,596	

Note: Gray-shaded parts were compared. Source: HCEFLCD

#### 3.2.2.2 Project Period

The planned project period was 82 months, or from March 2007 (ODA loan signing) to December 2013 (completion of the watershed conservation activities). The actual project period was 94 months, or from March 2007 to December 2014 (equivalent to 115% of the original plan). The project period was slightly longer than planned<sup>18</sup>. The difference between the planned

<sup>17</sup> The exchange rate used for planned cost: MAD 1: JPY 13.4. The lowest exchange rate was JPY 9.0 against 1 MAD. The exchange rate as of end of 2015 was 12.3 JPY against 1 MAD. The average for 2008 - 2013 was 11.16 JPY against MAD 1.

<sup>18</sup> Regarding the project period, according to the Minutes of Discussions signed by JBIC and HCEFLCD on February

and the actual period was because the loan disbursement rate was low as of 2013, and it was decided to continue the watershed conservation activities until December 2014 against the planned completion of December 2013 in order to promote the loan disbursement and to strengthen the output of the watershed conservation activities further, considering the remaining period of loan disbursement (which was November 2015). In fact, the extension of the water conservation activities increased the achievement level of most of the outputs.

### 3.2.3 Results of Calculations for Internal Rates of Return (Reference only)

To calculate the Economic Internal Rate of Return (EIRR), the cost was defined as the project cost necessary for the project implementation and the benefit was defined as the estimated additional value of the forest products increased by the project. The project life is 50 years. The EIRR of the appraisal was 11.08% and the EIRR re-calculated at the time of the ex-post evaluation was 13.5%. This was due to the fact that the most of the actual benefits were larger than planned.

In light of the above, although the project cost was within the plan, the project period exceeded the plan. Therefore, efficiency of the project is fair.

## 3.3 Effectiveness and Impacts<sup>19</sup> (Rating: ②)

### 3.3.1 Effectiveness

#### 3.3.1.1 Quantitative Effects (Operation and Effect Indicators)

Among the three operation and effect indicators, actual values of the two indicators (i.e., “afforestation area” and “quantity of planting”) excluding the survival ratio after planting reached their target values sufficiently (Table 9).

With regard to the first indicator “afforestation area”, actual values of “indicator 1-1: afforestation area of assisted regeneration” reached the target value in 2012 in the OM Watershed, two years before the project completion, and in 2013 in the AEF Dam Upper Watershed, one year before the project completion. The achievement degree in 2016, two years after the project completion, was 133% in the OM Watershed and 147% in the AEF Dam Upper Watershed. Actual values of “Indicator 1-2 afforestation area of afforestation for protection” reached its target value in 2016 in the OM Watershed, two years after the project completion

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7, 2007, the project completion was defined as “completion of the scope of work,” which was planned for December 2013. However, HCELCD did not agree on the above comparison of the project period in the ex-post evaluation, insisting on comparing the planned and actual loan disbursement periods as project completion for the reasons that the extension of the watershed conservation activities was approved in 2013 at the National Monitoring Committee attended by representatives of the JICA Morocco office to further strengthen the output level of such activities and promote the loan disbursement.

<sup>19</sup> Sub-rating for Effectiveness is to be put with consideration of Impacts.

and in 2013 in the AEF Dam Upper Watershed, one year before the project completion. The achievement degree in 2016 was 108% in the OM Watershed and 118% in the AEF Dam Upper Watershed.

With regard to the second indicator, “quantity of planting (seedlings),” actual values of “indicator 2-1 quantity of planting of assisted regeneration” reached the targets in 2010 in the OM Watershed and in 2012 the AEF Dam Upper Watershed. The achievement degree in 2016 was 175% in the OM Watershed and 178% in the AEF Dam Upper Watershed. Regarding the “indicator 2-2 quantity of planting of afforestation for protection,” actual values reached the targets in the OM Watershed in 2013 and in the AEF Dam Upper Watershed in 2012. The achievement degree in 2016 was 125% in the OM Watershed and 141% in the AEF Dam Upper Watershed.

As for the third indicator, “survival ratio after planting,”<sup>20</sup> the actual value was greatly different from year to year. For instance, in the OM Watershed, the survival ratio after planting of the assisted regeneration was 3% in the lowest year, 5% as attainment degree against the target value (60%) of survival ratio of each planting year, 87% in the highest, 145% as attainment degree against the target value (60%) of survival ratio of each planting year. The attainment degree against the target value (60%) of survival ratio of each planting year was 59% on average from 2008 to 2016. Similarly, in the AEF Dam Upper Watershed, the survival ratio after planting of the assisted regeneration was 3% in the lowest year, 5% as attainment degree against the target value (60%) of survival ratio of each planting year, 64% in the highest year, 107% as attainment degree against the target value (60%) of survival ratio of each planting year. The attainment degree against the target value (60%) of survival ratio of each planting year was 68% on average from 2008 to 2016. In the year when the survival ratio was low, external factors such as the influence of exceptional drought greatly affected the survival ratio. Evaluated comprehensively, the achievement degree was judged to be moderate. As reference information, the survival ratio for 2 years as of 2015, which combined both assisted regeneration and afforestation for protection, was 43% in the OM Watershed. In the AEF Dam Upper Watershed, the survival ratio of the assisted regeneration for more than 2 years was 37% (62% of the target) in 2014 and that of afforestation for protection was 5-75%<sup>21</sup>. This improvement was due to the fact that the survival ratio was affected by non-compliance with a grazing ban by the local population before, but it began to be observed gradually in the OM Watershed and maintenance after planting and rainfall had a positive influence on the survival ratio in the AEF Dam Upper

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<sup>20</sup> According to “Operation and Effect Indicator Reference for ODA Loan 14. Forestation, JICA”, a 5-year survival ratio after planting is said to be desirable. In Morocco, HCEFLCD collected those data 1 year after planting, and it was decided to use the survival ratio of one year after planting as an operation and effect indicator at the time of the project appraisal. Because there was no substitute indicator to replace the survival ratio of planting trees, in the ex post evaluation the data on the survival ratio of 1 year after planting of the project period was comprehensively examined.

<sup>21</sup> Documents provided by JICA.

Watershed in 2013-2014.

Table 9. Operation and Effect Indicators of the Project (accumulation)

		Target	Actual										Attainment degree (compared to 2016)
		2015	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	
		1 year after completion	2nd Year	3rd Year	4th Year	5th Year	6th Year	7th Year	Completion Year	1 year after completion	2 years after completion	3 years after completion	
<b>Indicator 1 Afforestation area (ha) (accumulation)</b>													
1-1 Assisted regeneration	OM Watershed	1,200	200	400	850	1,150	1,350	1,350	1,450	1,550	1,600	1,650	133%
	AEF Dam Upper Watershed	1,879	100	250	450	1,150	1,800	2,200	2,406	1,879	2,767	3,597	147%
	Total	3,079	300	650	1,300	2,300	3,150	3,550	3,856	3,429	4,367	5,247	142%
1-2 Afforestation for protection	OM Watershed	2,690	270	820	870	1,390	1,890	2,390	2,610	2,710	2,910	3,010	108%
	AEF Dam Upper Watershed	3,675	500	1,100	1,600	2,400	3,100	3,850	3,950	3,775	4,325	5,062	118%
	Total	6,365	770	1,920	2,470	3,790	4,990	6,240	6,560	6,485	7,235	8,072	114%
<b>Indicator 2: Quantity of planting (seedlings) (accumulation)</b>													
2-1 Assisted regeneration	OM Watershed	288,000	70,000	148,374	298,920	425,170	505,170	505,170	551,420	591,420	611,420		175%
	AEF Dam Upper Watershed	704,625	62,500	152,464	260,589	635,729	1,016,979	1,257,113	1,319,613	1,319,613	1,655,613		178%
	Total	992,625	132,500	300,838	559,509	1,060,899	1,522,149	1,762,283	1,871,033	1,911,033	2,267,033		178%
2-2 Afforestation for protection	OM Watershed	1,344,462	136,000	495,166	526,416	931,893	1,302,493	1,675,889	1,854,849	1,914,849	2,034,849		125%
	AEF Dam Upper Watershed	1,836,765	401,375	849,162	1,133,090	1,585,219	2,060,569	2,598,769	2,661,269	2,715,269	3,034,450		141%
	Total	3,181,227	537,375	1,344,328	1,659,506	2,517,112	3,363,062	4,274,658	4,516,118	4,630,118	5,069,299		134%
												Average of attainment degree against the target value	
3-1 Assisted regeneration	OM Watershed	60%	16%	6%	53%	3%	87%	N.A.	60%	32%	27%		
	(Attainment degree against the target value)		27%	10%	88%	5%	145%	N.A.	100%	53%	45%		59%
	AEF Dam Upper Watershed	60%	3%	64%	41%	36%	28%	29%	60%	No plantation	63%		
(Attainment degree against the target value)		5%	107%	68%	60%	47%	48%	100%	No plantation	105%		68%	
3-2 Afforestation for protection	OM Watershed	60%	11%	32%	63%	3%	29%	18%	37%	65%	20%		
	(Attainment degree against the target value)		18%	53%	105%	5%	48%	30%	62%	108%	33%		51%
	AEF Dam Upper Watershed	60%	63%	58%	59%	36%	39%	33%	60%	No plantation	64%		
(Attainment degree against the target value)		105%	97%	98%	60%	65%	55%	100%	No plantation	107%		86%	

Source: HCEFLCD.

### 3.3.1.2 Qualitative Effects (Other Effects)

(1) Improvement of the Environment (Water and Soil Conservation by Improving Quality and Quantity of forest)

According to the interview with personnel of the executing agency and local population in the ex-post evaluation and to the documents provided by JICA, positive effects were confirmed such as the decrease in quantity of forest resource collection in most of the target rural communes after the project implementation, because the local population began to recognize the importance of forest resources and land conservation through awareness-raising activities. In the AEF Dam Upper Watershed, it was confirmed through the field survey in the ex-post evaluation that flood damage to agricultural land and livestock decreased from before due to the installation of check dams and filter fences by this project.

(2) Improvement of the Living Standard of the Local Population and Promotion of Poverty Alleviation

In the project, 28 community organizations formulated the PDUST (3-year plan) through community participation under component 5, carrying out a total of 83 activities (see Table 10).

Table 10 shows the degree of success by activity evaluated by a consultant hired by consulting services. In the case of beekeeping and fruit trees production, in which relatively moderate and low results were observed because members did not know in the beginning how to do such activities due to lack of knowledge and experience, they succeeded after the second trial in some cases. Finally, most organizations got positive results to certain degree.

Table 10. Evaluation of Results of PDUST implementation

Item	Number	Evaluation of Success Level			
		Good	Fair	Bad	N.A.
Apiculture	21	8	11	2	0
Agricultural training	15	14	1	0	0
Construction/maintenance of roads	14	9	4	1	0
Fruit trees plantation (olive, almond, etc.)	12	6	6	0	0
Construction/rehabilitation of water points	12	8	2	1	1
Construction/rehabilitation of small-scale irrigation	6	6	0	0	0
Distribution of seeds of saffron	2	1	0	1	0
Improvement of lands	1	1	0	0	0
Total	83	53	24	5	1
Ratio		64%	29%	6%	1%

Note: The result of the PDUST implementation was qualitatively evaluated by the consultant in three stages (“good,” “fair” and “bad”). The concrete definition could not be verified in the ex post evaluation. Source: HCEFLCD.

In the interview survey conducted in the ex-post evaluation, all 28 associations stated that the living conditions improved through the implementation of the project. Details are an increase in income, a decrease in expenditure, diversification of income sources, improvement of access by construction/maintenance of roads, etc. Associations that obtained beehives and equipment for beekeeping sell harvested honey, and associations that obtained olive trees diversified their income sources by selling olive oil. As an example, beekeepers earn from 10,000 dirhams to 40,000 dirhams per association per year, and the income earned is shared among members of the association. Also, in-house consumption of harvested olives has led to a reduction in the purchase cost of olive oil, which helped improve livelihoods of the local population. Regarding beekeeping, one association in Ben Slimane Province in the OM Watershed was awarded the gold medal in the competition of domestic products in Morocco in 2014.

As mentioned above, results of the PDUST were fair to good in the most of the implemented PDUST. However, there was an association in beekeeping, which succeeded once but did not work well afterwards, and the delivered beehives were not fully utilized.

As a whole, it can be said that this project contributed to improving the living standard of the target population of the target area.





Honey awarded a gold medal at the domestic product competition in 2014 (OM Watershed, Ben Slimane Province)



Olive plantations managed by a community organization (OM Watershed, Settat Province)

### (3) Strengthening the Implementation Capacity of Community Associations

Community associations which implemented PDUST strengthened planning and monitoring capacities by formulating and implementing the PDUST and preparing annual reports through support of the executing agency and consultants hired by consulting services. In addition to the formulation and implementation of the PDUST, community associations conducted awareness-raising activities concerning forest conservation, such as appropriate forest resource collection and land use, for the local population, and they implement afforestation and monitoring of the use of forest resources. In this way, community associations enhanced organizational capabilities and utilize such capabilities in utilization and conservation of forest resources.

In light of the above, since the achievement level of the survival ratio, one of the operation and effect indicators used to see the degree of afforestation after planting, is fair, the effectiveness was judged to be fair.

### 3.3.2 Impacts

#### 3.3.2.1 Intended Impacts

##### (1) Conservation of Forest Resources in the Target Area

##### 1) Decrease in Forest Resource Extraction Volume

As mentioned above, reduction of forest resource collection was confirmed as an impact of this project. The local population has no need to sell forest resources as firewood or charcoal in order to earn income because they received compensation for a grazing ban and their incomes have increased due to fruit tree production such as olives and beekeeping through implementation of the PDUST. In addition, distribution of improved stoves to the local population free of charge in the successor to this project in the AEF Dam Upper Watershed since 2015 has contributed to the decline of the need for forest resources by 50%, as well as the collection of forest resources. In the AEF Dam Upper Watershed, when comparing the situations in 2014 and 2016, the quantity of trees logged decreased by 70% and the cases of illegal logging

decreased by 45%. Illegal logging of Himalayan cedar, which was ten plants a month before this project, decreased to one in two to three months at the time of the ex post evaluation. In Ben Slimane province in the OM Watershed, the number of grazing ban violations was 42 cases in 2016, whereas it was 13 cases in 2017. The illegal logging of raw trees has drastically decreased from 31 in 2016 to 14 in 2017.

## 2) Changes in Type of Collected Forest Resources

Before this project, the local population in the target area was collecting all kinds of forest resources regardless of type, such as dead trees, raw trees, etc. Through awareness-raising activities implemented by the project, they became aware of the importance of forest conservation and now they only collect olive trees planted through the PDUST and dead trees of other tree species as firewood.

## 3) Erosion Prevention Effect

Before this project, floods caused damage to agricultural lands and livestock. In areas where check dams and filter fences were installed by the project, such damage was no longer observed. Observing these effects, residents requested the executing agency to install check dams or fences on private lands, and check dams or fences were also installed in private lands.

### 3.3.2.2 Other Positive and Negative Impacts

#### (1) Promotion of Women's Participation in Socioeconomic Activities

In the project, socio-economists were employed in the consulting services, and at the provincial level, several male and female “animators” were assigned to a team for awareness-raising activities in UOPS of the Provincial Direction for Water and Forest and Combating Desertification (hereinafter referred to “DPEFLCD”<sup>22</sup>). In the awareness-raising activities, viewpoints on gender were considered in collecting opinions from men and women through assignment of male and female animators in the needs survey before establishing the PDUST. The animators and DPEFLCD promoted women's participation in implementing the PDUST. Women became members of community organizations in 16 out of 22 organizations in Sefrou Province in the AEF Upper Watershed. Table 11 shows the participation ratio of women in the associations concerned with the PDUST. Women were elected as board members<sup>23</sup> in 15 out of the above 16 associations.

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<sup>22</sup> Direction Provinciale aux Eaux et Forêts et à la Lutte Contre la Désertification.

<sup>23</sup> The board consists of 7 to 11 persons whose functions are: representative, deputy representative, treasurer and advisers (March 2018, interview in the AEF Dam Upper Watershed)

Table 11. Ratio of Women in the Associations  
concerned with the PDUST (case of Sefrou Province)

Ratio of women	Number of associations
100%	3
50–60%	6
20–49%	4
3–15%	3
0%	6
Total	22

Source: HCEFLCD.

## (2) Resettlement and Land Acquisition

A part of the project area of the OM Watershed was transferred to the AEF Dam Upper Watershed because owners of the private land did not agree with the use of the private land. However, it did not cause a negative impact.

In light of the above, among the three operation and effect indicators, afforestation area and quantity of planting achieved their target values sufficiently. The actual value of survival ratio after planting was greatly different from year to year. In the year when the survival ratio after planting was low, external factors such as the influence of exceptional drought greatly affected the survival ratio after planting. In this regard, the achievement degree was judged to be fair. Positive impacts were recognized such as an increase of income and diversification of income sources brought by the livelihood improvement activities and a decrease in the quantity of forest resources collected and illegal logging as a result of change in consciousness through awareness-raising activities for the local population and livelihood improvement activities. No negative impact on the natural environment was observed and there was no resettlement. Among the operation and effect indicators, afforestation area and quantity of planting indicate the achievement result at a certain “point” whereas the survival ratio after planting indicates the degree of afforestation after a certain “period.” In this ex-post evaluation, as a result of placing importance on the achievement level of the survival ratio after planting, the effectiveness/impact was judged to be fair.

## 3.4 Sustainability (Rating: ③)

### 3.4.1 Institutional/Organizational Aspect of Operation and Maintenance

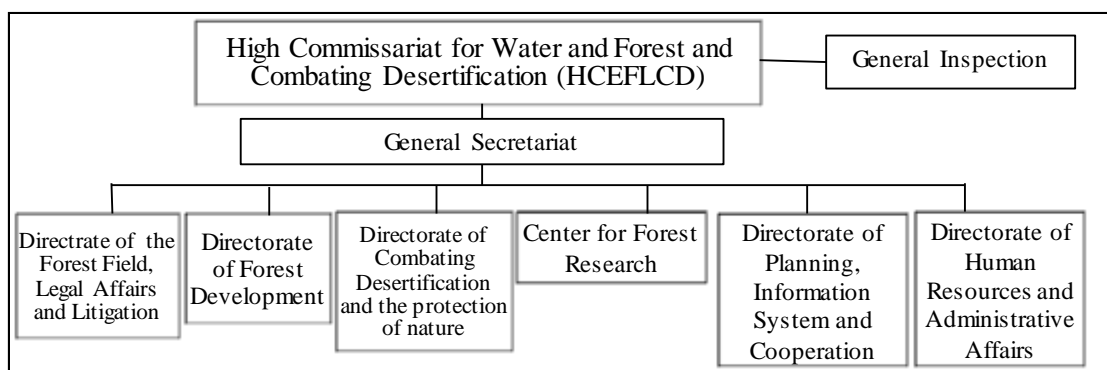
#### (1) Institutional/Organizational Aspect of Executing Agency

The operation and maintenance of the project is carried out by the Regional Direction for Water and Forest and Combating Desertification (hereinafter referred to as “DREFLCD”<sup>24</sup>),

<sup>24</sup> Direction Régionale aux Eaux et Forêts et à la Lutte Contre la Désertification

which is a regional office of HCEFLCD and DPEFLCD.

HCEFLCD (Fig. 1) conducts planning and budget formation concerning watershed conservation in Morocco. At the time of the appraisal and during the project implementation, HCEFLCD was high commissariat directly under the prime minister. Although it became a commissariat under the Ministry of Agriculture, Fisheries, Rural Development, Water and Forests in March 2017 through the reorganization of the ministries and agencies, there was no change in position, organizational structure and role. After the reorganization of ministries and agencies, it became easier for HCEFLCD to collaborate with the agricultural sector in providing continuous technical support to agricultural components introduced by the PDUST, such as beekeeping and planting fruit tree, and in managing overgrazing, which is a major human pressure in forest conservation. Such change is a positive factor in regard to organization.

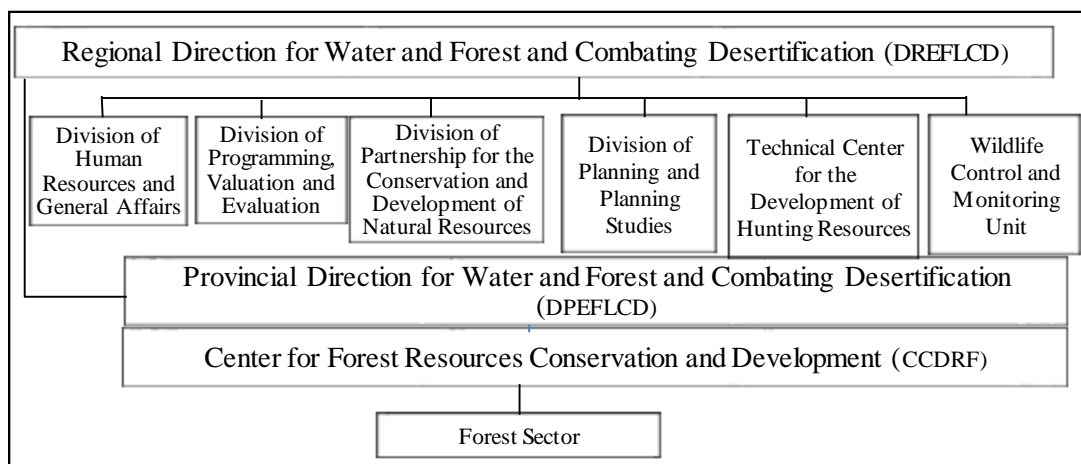


Source: Developed by the evaluator of the ex-post evaluation based on the documents provided by the executing agency

Figure 1 Organizational Chart of HCEFLCD

DREFLCD and DPEFLCD played a central role in project operation during the project implementation. They also currently play a pivotal role in the operation and maintenance of the project's effect (Fig. 2). At the provincial level, the Division of Partnership for the Conservation and Development of Natural Resources was newly established in 2009, which provides compensation for the local population and follows up with agreements between the DREFLCD and the local population. In 2009, the Center for Forest Resources Conservation and Development (hereinafter referred to as "CCDRF<sup>25</sup>") was strengthened; only one person was assigned to the CCDRF before, but after 2009, several persons have been assigned to this center. In this regard, the operation and maintenance system has been strengthened at a level closer to the local population.

<sup>25</sup> Centre de Conservation et de Développement des Ressources Forestières



Source: Developed by the evaluator of the ex-post evaluation based on the documents provided by the executing agency

Figure 2 Organizational Chart of DREFLCD and DPEFLCD

One of the achievements of the project related to the institutional and organizational aspects of sustainability was the improvement of relations between the administration and the local population and the establishment of confidence between them. Before the project, the local population was afraid of forest guards of CCDRF, seeing them as officials who “crack down” on the local population collecting forest resources. Due to such tension, some of the target rural communes took time to organize community associations to receive compensation for grazing bans or to implement the PDUST, since it took a great deal of time to mitigate the tension the local population had toward the institutionalization. DPEFLCD and CCDRF officials patiently conducted awareness-raising activities, emphasizing dialogue between the administration and the local population, communicating the benefit of the PDUST and explaining that the appropriate use and conservation of forest resources will lead to the sustainable use of resources. As a result, the relationship between the local population and the administration changed from “tense” to “trusting.” Officials of DPEFLCD who were engaged in implementation of this project acquired communication skills in the participatory approach training organized by the consultant that was engaged in technical assistance and utilized the acquired skills in dialogue with the local population. Currently, the local population cooperates in afforestation and reporting illegal logging to forest guards. Members of this population ask forest guards to construct or rehabilitate mountainous/forestry access roads and to distribute beehive boxes and improved stoves. Such behaviors were not observed before the project. This trust-based relationship is maintained, even at the time of the ex-post evaluation, which is a factor that ensures the institutional/organizational aspect of sustainability.

## (2) Institutional/Organizational Aspect at the Community Level

Most community associations formed for the implementation of the PDUST are maintained

and functioning well; observing the grazing ban zones, they continue activities introduced by the project such as beekeeping, planting fruit trees and maintain constructed/rehabilitated rural roads, water sources and irrigation canals. These associations continue awareness-raising activities for the local population. In the OM Watershed, the local population did not agree with organizing associations receiving compensation for grazing bans; the association was not organized and compensation was not paid. However, the effect of raising awareness at the community level has been gradually recognized. As stated below, after the law on grazing was established in 2016, illegal logging cases declined. It was judged that any community association that was not organized in the OM Watershed has not negatively influenced the sustainability of the project's effect.

### (3) Enhancement of the Management of Overgrazing in the Legal System

As stated in 3.1.1, the pressure on forest resources due to overgrazing was a problem nationwide and in the project target area. In March 2016, the law on the movement for grazing on and the use and maintenance of grazing lands was enacted. This law established the basic principles and general rules for the improvement of grazing and cultivated lands, for the use and development of grazing lands and resources, for the movement across grazing lands and for the movement of livestock.

In the OM Watershed, when awareness-raising activities started in 2009, the local population did not agree with the organizing associations receiving compensation for grazing bans. No associations were thus formed, and compensation was not paid. However, as stated in 3.3.2.1 Intended Impacts, the amount of illegal grazing and logging of raw trees in the grazing-prohibited areas in Ben Slimane Province has drastically decreased from 2016 to 2017 after the law was established. Although it is a little premature to verify the effect of the law's establishment, institutional strengthening in the legal system is a positive factor in the sustainability of institutions and organizations, as well as changes in the awareness of the local population.

### 3.4.2 Technical Aspects of Operation and Maintenance

#### (1) Administration Level

DREFLCD and DPEFLCD, which are responsible for the operation and maintenance of the project's outputs (reconstruction of degraded forest ecosystem, improvement of grazing and cultivated lands, treatment of lands affected by rill and gully erosion, improvement of forest infrastructure, etc.), conduct monitoring and take necessary measures after planting (reforestation in cases where the survival ratio is below 60%), conduct maintenance for installed structures and take necessary measures for problems reported by the local population in the jurisdiction area without delay. In this regard, there is no technical problem. In addition,

DREFLCD officials are still using the skills acquired through GIS training implemented by this project for formulating plans. Furthermore, skills for communicating with the local population, which were acquired in the training attended by officials of DPEFLCD as part of a participatory approach, as mentioned above, are utilized in the implementation of the PDUST and awareness-raising activities for the local population in the successor projects.

## (2) Community Level

Effects of the project brought by the PDUST, such as beekeeping, planting fruit trees, constructing and rehabilitating rural roads and water sources and so on, are well maintained by community associations.

On the other hand, associations conducting beekeeping and producing olives wish to acquire further knowledge and skills to improve income and to sustain their activities and facilities, such as the irrigation facilities necessary for maintaining planted trees. Since these requests include those exceeding the function of HCEFLCD, cooperation with the departments concerned with the Ministry of Agriculture, Fisheries, Rural Development, Water and Forests is desirable in the future. In the interview with DREFLCD and DPEFLCD at the time of the ex-post evaluation, it was confirmed that information sharing was done as collaboration with the agricultural sector; however, collaboration at a level closer to the local population is desired. For instance, it is required for CCDRF forest guards closest to the local population to transfer the CCDRF's requests or any problems the guards notice during their periodical inspection in the forest to the agricultural sector (e.g., beekeeping, which was once successful, has not been maintained after its initial success).

### 3.4.3 Financial Aspects of Operation and Maintenance

Table 12 shows the budget of HCEFLCD, and Table 13 shows the budget of the DREFLCD. HCEFLCD formulated a ten-year program and a detailed three-year program, which is based on the ten-year program. The budget has been increasing since 2015, and the budget for maintenance is ensured to be about 6% of the total budget every year. The budget for operation and maintenance has never been short in HCEFLCD. DREFLCD formulates an annual plan based on the three-year program, and the budget has been allocated based on the annual plan; so far, there has been no shortage. The Government of Morocco has allocated its own budget for successor projects since 2015 in both target watersheds.

Table 12. HCEFLCD Budget

Unit: Million dirham

	Total budget	Budget for operation and maintenance
2006	702.7	17.2
2007	702.1	10.6
2008	812.4	41.0
2009	983.4	41.0
2010	1001.4	41.0
2011	1088.0	40.0
2012	1071.8	42.8
2013	935.0	45.0
2014	1008.0	45.0
2015	1134.0	73.0
2016	1168.2	76.2
2017	1191.2	76.2

Source: HCEFLCD.

Table 13. DREFLCD Budget

Unit: Million dirham

	Center Region		Fès Boulemane Region	
	Total budget	Budget for operation and maintenance	Total budget	Budget for operation and maintenance
2006	42.1	2.2	29.7	2.2
2007	38.6	2.0	31.6	1.5
2008	58.5	6.6	41.2	1.7
2009	83.8	3.3	49.5	1.8
2010	54.0	2.1	52.5	1.4
2011	69.6	2.5	62.0	2.3
2012	77.1	2.0	64.5	2.3
2013	68.9	2.6	44.8	2.6
2014	65.3	2.6	44.8	2.6
2015	40.8	3.7	43.0	2.6
2016	33.5	1.9	48.4	2.3
2017	34.7	2.2	42.7	2.3

Note: The above data show the result of the budget for the operation and maintenance of all areas, including the project's target area, covered by the DREFLCD. Source: HCEFLCD.

As described in the next section, “3.5.4 Status of operation and maintenance,” related infrastructures, such as forests and structures, are well managed and maintained. The operation and maintenance budget is stable, since the government of Morocco has been implementing the successor projects using its own budget since 2015, the year following the completion of the project.

#### 3.4.4 Status of Operation and Maintenance

The status of the project's output has been further strengthened after the project's



completion, as described in the results of each component. In particular, the actual result of the afforestation area and the amount of planting due to the assisted regeneration and afforestation for protection (Table 9), as well as planting fruit trees and regenerating natural grazing lands, have continuously increased since the government of Morocco began implementing successor projects with the same components as this project with its own budget since 2015. Other effects are also maintained and managed in the successor projects. Also, the equipment provided by component 6 is well maintained without any problems.

In light of the above, no major problems have been observed in the institutional, technical, financial aspects and current status of the operation and maintenance system. Therefore, sustainability of the project effects is high.

#### **4. Conclusion, Lessons Learned and Recommendations**

##### 4.1 Conclusion

The objective of this project was to restore degraded lands and improve the livelihood of the local population by carrying out afforestation and livelihood activities in OM Watershed in the regions of Chaouia Ourdigha and AEF Dam Upper Watershed in the region of Fès-Boulemane, thereby contributing to natural resources conservation and to poverty alleviation of the local population in the above two regions.

The project has been highly relevant to the development plan and development needs of Morocco, as well as Japan's ODA policy; therefore its relevance is high. Among the three operation and effect indicators, those of afforestation area and quantity of planting achieved their target values sufficiently. The actual value of the survival ratio after planting was greatly different from year to year. In the year when the survival ratio after planting was low, external factors such as the influence of exceptional drought greatly affected the survival ratio after planting. In this regard, the achievement degree was judged to be fair. Positive impacts were recognized such as an increase in income and diversification of income sources brought by the livelihood improvement activities and a decrease in the quantity of forest resources collected and illegal logging as a result of change in consciousness through awareness-raising activities for the local population and livelihood improvement activities. No negative impact on the natural environment was observed and there was no resettlement. Among the operation and effect indicators, those of afforestation area and quantity of planting indicate the achievement result at a certain "point" whereas the survival ratio after planting indicates the degree of afforestation after a certain "period." In this ex-post evaluation, as a result of placing importance on the survival ratio after planting, the effectiveness/impact was judged to be fair. Although the project cost was within the plan, the project period slightly exceeded the plan; therefore the efficiency of the project is fair. In sustainability, with regard to the institutional/organizational

aspects, the organizational structure of the executing agency, the HCEFLCD is maintained at central, regional and provincial levels from the appraisal to the ex-post evaluation. In technical aspects, the executing agency conducts monitoring after afforestation, and maintenance of check dams and filter fences without problems. There is no problem in financial aspects. Therefore, sustainability of the project effects is high.

In light of the above, this project is evaluated to be satisfactory.

## 4.2 Recommendations

### 4.2.1 Recommendations for the Executing Agency

#### (1) Continuous Support for the Local Population to Strengthen Compliance with Grazing Bans

Community associations that receive compensation for grazing bans were not formed due to the disagreement of the local population, and no compensation was paid in the OM Watershed. The effects of awareness-raising activities for the local population that were organized by the project are gradually being recognized, and illegal grazing and logging in the grazing-prohibited area have decreased since the law's establishment in 2016 clearly defines the grazing method. Although such effects are positive factors for the sustainability of the project's effects, it is recommended that DREFLCD and DPEFLCD (including CCDRF) in the OM Watershed intensively and periodically visit communes where such an agreement was not obtained by collaborating with officials of other administrative sectors. Then, it is recommended for DREFLCD and DPEFLCD to continue an open dialogue with the local population and to conduct awareness-raising activities with view to thoroughly informing locals about the law. It is recommended for them to monitoring for illegal grazing and logging, ensuring that grazing bans are observed in the entire target area.

## 4.3 Lessons Learned

### (1) Increased Frequency of Reviewing Operations and Effect Indicators

The operation and effect indicators of the project were set for a target year of 2015 at the time of the appraisal, and they were revised at the time of the mid-term review in 2011. Despite the fact that the operation and effect indicators on the afforestation area and the amount of planting reached their target values in the OM Watershed in 2012 and in the AEF Dam Upper Watershed in 2013, their target values were not revised. In addition, when the one-year extension for watershed conservation activities was moved from December 2013 to December 2014, a revision of the target values to be achieved two years after the project completion year (2016) was not conducted. Since it was difficult to assume target values from interviews with concerned parties or information obtained from existing documents in this ex-post evaluation, and because there were no alternative data, the target values revised in 2011 and targeted for 2013 and the actual result at the time of the project completion (2014) were compared when

evaluating “efficiency.” In evaluating “effectiveness,” the target values revised in 2011, for which the target year was 2015, and the actual result as of 2016 were compared. Based on the interviews with concerned parties at the time of the ex-post evaluation, it is assumed that the indicators were not revised because concerned parties, who were members of the national monitoring committee of the project, such as the executing agency JICA, did not fully recognize the necessity of revising the target values based on the monitoring result.

Given that the indicators reached the target value before the target year and that the period for the project activities was extended, JICA and the executing agency should have revised the target values when the indicators were achieved or when the extension of the period for the project activities was decided to continue pushing project activities toward the clear targets. As for future project management, it is desirable that JICA and the executing agencies monitor the achievement status of the indicators, not only at the time of the mid-term review but once a year and at the time of the project completion review. They should also revise the indicator as necessary by making a prospect of the achievement of the indicators for the target year.

## (2) Clarification of the Definition of Indicators and the Method of Their Measuring at the Planning Stage and Project Commencement

In this project, the survival ratio after planting, which was one of the operation and effect indicators, was targeted for the survival ratio of one year after planting. According to the JICA’s operation/effect indicator guideline (afforestation), the survival ratio after planting can be appropriately evaluated by examining the survival ratio for a certain period. Regarding the indicators necessary to verification from a mid- and long-term perspective, it is desirable to discuss the monitoring method that can verify the project’s effect at the time of appraisal, confirming the usual monitoring method of the executing agency. During the project’s implementation, it is better for JICA and the executing agencies to collaborate to analyze the indicators’ achievement status in anticipation of the ex-post evaluation.

Comparison of the Original and Actual Scope of the Project

Item	Plan	Actual
1. Project Outputs		
(1) Watershed Conservation Activities		
1) Reconstruction of Degraded Forest Ecosystem (afforestation, tending of plantation, thinning and installation of fences, etc.)	A total of 59,500ha	A total of 80,758ha
2) Grazing and Cultivated Lands Improvement (sylvopastoral plantations, installation of fences and fruit tress plantation, etc.)	A total of 13,470ha	A total of 11,293ha
3) Treatment of Lands Affected by Rill and Gully Erosion (Installation, maintenance and rehabilitation of check dams and filter fences)	38,500m <sup>3</sup>	62,786m <sup>3</sup>
4) Forest Infrastructure Improvement		
Nurseries improvement	4 sites	5 sites
Construction/maintenance of forest road	312 km	381 km
Maintenance of forest firebreaks	53,000 ha	21,400ha
Construction/maintenance of forest offices	40 offices	53 offices
5) Local Population Livelihood Improvement	22 PDUST	28 PDUST
6) Equipment for Institutional Strengthening		
Vehicles and trucks	21 units	As planned
Computers	37 units	
Computer related software equipment	3 sets	
audio-visual equipment	20 sets	
(2) Consulting Services		
Overall Project Management	International consultant:	International consultant:
Monitoring and Evaluation of the Project (Mid-Term Review and Review at the time of Project Completion)	11 M/M	5.82 M/M
Training Program for the Executing Agency (participatory approach, GIS)	National consultant:21M/M	National consultant: 12 M/M
	Animators: 906 M/M	Animators: 472 M/M
2. Project Period	March 2007 – December 2013 (82 months)	March 2007 – December 2014 (94 months)
3. Project Cost		
Amount Paid in Foreign Currency	44 million yen	15 million yen
Amount Paid in Local Currency	4,178 million yen (311 million Moroccan dirham)	2,234 million yen (201 million Moroccan dirham)
Total	4,222 million yen	2,249 million yen
ODA Loan Portion	3,165 million yen	1,793 million yen
Exchange Rate	1 MAD = 13.4 yen (As of December 2006)	1 MAD = 11.1 yen (Average 2009 and 2017)
4. Final Disbursement	November 2015	