

AGENCY FOR PARTNERSHIP AND PROGRESS

KINGDOM OF MOROCCO

Fruit Tree Productivity Project

Extension Activity

POST-COMPLETION ECONOMIC AND FINANCIAL ASSESSMENT

MAIN REPORT AND APPENDICES

Report No. -----

CURRENCY EQUIVALENT

Local Currency Unit		Moroccan Dirham (MAD)
USD	=	7.77 (Start-up)
USD	=	8.33 (Current)

WEIGHTS AND MEASURES ET MEASURES

International Metric System

Fiscal Year

1 January– 31 December

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ABBREVIATIONS AND ACRONYMS

APP	Agency for Partnership and Progress
CF	Catalytic Fund
CIF	Compact Implementation Fund
DG	Director General
ERR	Economic Internal Rate of Return
FRR	Financial Internal Rate of Return
FTPP	Fruit Tree Productivity Project
IAP	Improved Agricultural Practices
M&E	Monitoring and Evaluation
MCA	Millennium Challenge Account
MCC	Millennium Challenge Corporation
MV	Maroc Vert
NGO	Non-Governmental Organization
NIAR (INRA)	National Institute of Agricultural Research
PM	Picholine Marocaine
TAP	Traditional Agricultural Practices
UNOPS	United Nations Office for Project Services
USAID	United States Agency for International Development

ACKNOWLEDGEMENT

This report was produced by MA Hassani, a freelance consultant, it presents the results of the post-completion assessment of the expected impact in terms of ERR of the Extension of Fruit Tree Plantations in the Rain Fed Areas, a component of the Fruit Tree Productivity Project which, in turn, is an integral part of the MCC-funded Programme in Morocco. The author is very grateful to Essaid AZZOUZI, the Director of Monitoring and Evaluation, Mr. Mouhcine DAOUDI, M&E Coordinator of APP, Khalid AIT.OMAR, Head of Monitoring and Evaluation of the PMU, and Ms. Nadira BEJDAD, Statistical Analyst at the PMU for their continuous support during the preparation of this report and their comments on its different versions. The author also thanks the staff of Technical Assistance Groups TC 5/AB and TC1 A/B, particularly Mr. Al abyed for providing data and Mr. Moussaoui for his advice. Special thanks go to Mr. B Boulouha who read and commented on the initial draft of the technical parameters regarding olive yield formation, cropping patterns and agricultural practices. Finally, the author is particularly grateful to the farmers, their associations and cooperatives and to the staff of provincial Directorates of Agriculture in the provinces of Tetouan, Ouezzane, Taza, Taounate, Azilal and Khenifra who welcomed the author. Their enthusiasm to provide answers to many detailed questions was critical to this exercise. Special thanks go to Stefan Osborne and Ryan A. Moore from MCC for their prompt feedback, stimulating discussions and suggestions they provided throughout the preparation of this report.

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EXECUTIVE SUMMARY

1. The emphasis of the **Terms of Reference (TOR)** of this assignment is primarily on economic and financial assessment of one specific activity of the Fruit Tree Productivity Project, namely the extension of fruit tree plantations to the hillside areas dominated by traditional cultivation of cereal crops under rain fed condition.

2. The approach of the present exercise has focused on three aspects that are of crucial importance to the economic and financial impact assessment of the project. (i) The role and the significance of cereal crops in the livelihood of the smallholders in the project area, (ii) the motivation of the smallholder to switch from traditional agricultural practices (TIP) being used in fruit tree husbandry to improved agricultural practices (IAP), and (iii) the willingness of the smallholders to internalize wholly or partly the cost associated with the protection of the natural resource base.

PROJECT BACKGROUND

3. **The Program.** On August 31, 2007, the Government of Morocco (GoM) and the Government of the United States of America, represented by the Millennium Challenge Corporation (MCC), signed a grant agreement (GA), the Millennium Challenge Compact MCC (The Program). The goal of the Program is to reduce poverty through economic growth by increasing productivity and improving employment in sectors with high growth potential, namely, the agriculture, handicrafts, and small-scale fishing sectors. The Program was composed at the design phase of five projects with a total cost of USD 697.5 million, this excludes the contribution of the Government of the Kingdom of Morocco (GoKM): (i) Fruit Tree Productivity (USD 338.7 million), (ii) Small-Scale Fisheries (USD 120.1 million), (iii) Artisan and Fez Medina (USD 95.5 million) (which includes the Functional Literacy and Vocational Training Activity), (iv) Enterprise Support (USD 42.6 million); and (v) Financial Services (USD 42.6 million). The remaining funds (USD 58 million) were allocated for program implementation

FRUIT TREE PRODUCTIVITY PROJECT

4. **The Fruit Tree Productivity Project (FTPP)** is the largest project of the program. Its **Strategy** calls, *inter alia* for: (i) increased and diversified agricultural production; (ii) increased opportunities for agricultural employment and income; (iii) halting of the process of environmental degradation of human origin; and (v) improvement professional training and capacity building of farmers and their associations and cooperatives. The overall **goal** of FТПP and its components is to accelerate economic growth of the rural economy and alleviate rural poverty particularly for subsistence smallholders who practice traditional rain-fed agriculture (mainly cereals). The main **specific objective** is to increase agricultural income and reduce its variability by replacing cereals (particularly wheat for which Morocco is not

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competitive on the international market) with commercial tree crops, where there lies a natural competitive advantage. The **Components** of FTTP include (i) The intensification and extension of fruit trees; plantations in the rain fed areas; (ii) Irrigation and intensification of olives; (iii) Irrigation and intensification of date palms; and (iv) Put in place “ Support services” for the targeted value chains, consisting of provision of specific professional training, creation of a scientific Board, to carry out appropriate market search studies and specific thematic studies pertaining to agro-industrial research and development , gender mainstreaming, improved access to micro credit and creation of job opportunities for the young. The Ministry of Agriculture and Marine Fisheries (MAMF) has the overall responsibility for **project implementation**.

5. **The FTTP Area**, covers dry land areas and small scale irrigated perimeters including date palm oases in 25 provinces. The project was expected to reach over 110,000 households at full development. Its total cost, at design stage, was estimated at USD 339.99 million of which USD 261 million for land development, 20.74 million for Catalyst Fund, and the remaining earmarked for training and capacity building, technical assistance, monitoring and evaluation, and administration. As of July 2013, About USD 323 million was committed and USD 251.81 million was disbursed.

6. One of the main activities of FTTP is concerned with expanding of fruit tree plantations in rain fed hillsides dominated by field crop cultivation. The original strategy of the Sub-project, stipulated replacement of field crops by fruit tree plantations. The Sub-project area is, in major part, hilly where the gradient varies from 5% to 30%. The target group consists of poor smallholders practicing mainly cereal cultivation. The average size of their land holdings is about 3 hectares fragmented and eroded due to their location – in sloping areas- and to the inappropriate agricultural practices. Yields of cereals are low and highly variable. The Sub-project intervention area, covers 158 perimeters in 17 provinces where, according to the original project document, the total planned plantations were set at: of 100,000 Ha of olive trees, 15000 Ha with fig trees, and 5,000 Ha with Almond trees. These targets were scaled down as result of project restructuring (Para: 9)

7. **Cost and financing**. The direct cost of planting about 60,700 trees as of July 2013 was approximately MAD 852 million or the equivalent of USD 103.2 million, an additional amount of MAD 196 million or the equivalent of USD 23.75 million total cost was also disbursed to pay for technical assistance, research, administration, monitoring and evaluation and contingencies While these figures are based on actual

expenditures they remain preliminary and can only be finalized when the FFTP accounts are reconciled.

8. **Sub-project status and major amendments.** The extension activity was re-scoped in 2010 when it became clear that the costs of contracts was underestimated due primarily to the considerable amount of Soil and Water Conservation works that were required but not accounted for. It was decided to partially reduce the size the original target of 120,000 Ha to 80,000 Ha, of which 62,000 Ha was programmed for funding by MCC and the remaining 18,000 Ha for funding by the GoM¹. The first pilot tree-planting contract was signed only on Feb 2009, 18 months after the signing of the Compact Agreement. The total area planted under MCC funding as of July 2013, was about 60,704 Ha of which, 57,814 Ha was planted with olive trees and 2,890 Ha with almond trees. After this re-scoping, the per hectare land development works increased by about 54 % in comparison with the original cost estimates.

9. **Targets and expected results.** The total area planted under MCC funding as of July 2013, was about 60,704 Ha (99% of the target) of which, 57,814 Ha was planted with olive trees, and 2,890 Ha with almond trees. About 34,592 Ha was handed over to the beneficiaries (57% of the target); and about 27,177 Ha (60% of the target) of planted area were accompanied with Soil and Water Conservation works.

ASSESSMENT METHOD AND LIMITATIONS

10. This assignment has been completed in two stages. The first stage consisted of data collection and validation, and the second stage of data evaluation, formulation of the working assumptions, computational work, result analysis, and report drafting.

11. The data collection² process engaged three different sources. (i) Official records and statistical bulletins, reports, thematic studies relevant project-produced documents; (ii) focus group discussions with project beneficiaries and non-beneficiaries, and, (iii) direct field observations. The validation process was completed both at the field level with the farmers and MoA officials and technicians, and via discussions with technical assistance providers, consultants, researchers and academics.

¹ Reallocation of the equivalent of about USD 40 million from (Makina) of the Fes Medina project to the FFTP.

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12. The validated data was used in the formulation of the working assumptions related to (i) fine-tuning the yields estimates of olives, labor requirements and input use; (ii) elaboration of cropping patterns, and crop budgets; (iii) IAP adoption rate, and coping strategies; (iv) estimation of actual direct and indirect investment costs; and (v) design of the different sensitivity tests and switching value to establish the robustness of the estimated FRR/ERR.

FINDINGS AND CONCLUSIONS

OUTCOME OF FIELDWORK

Beneficiary Focus Groups

13. **Coping strategy.** Field crop (cereals, legume and forage crops) cultivation is an activity of vital importance to the households' food security, and a source of badly needed liquidity for urgent expenditures. Farmers are unlikely to stop cultivation of these crops even if fruit trees are fully productive because it will always help in the diversification of sources of income.

14. **Farmers' satisfaction with land development works.** Most farmers expressed serious concerns regarding tree mortality arising from uncontrolled grazing and the short after-planting maintenance period. The uncontrolled grazing is blamed mostly on landless farmers and farmers from neighboring villages. Farmers felt that the period of maintenance of one year after planting was not sufficient. They considered that the short maintenance period together with uncontrolled grazing were responsible for the considerable damage to the plantations and high mortality rate of the trees. Farmers complained that the staggered tree planting technique constituted a problem because it rendered the land tilling using agricultural machinery both cumbersome and time consuming.

15. **Farmers' expectations in terms of yield and income.** Some farmers felt that they may not be able to exploit the olive value chain to its full potential. They may be forced to sell their olives on the trees either for pressing needs of funds or due to lack of access to market and/or nearby modern olive processing units, and most certainly to a lack of working capital. Most farmers stated that they would continue to intercrop

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even when the trees become fully matured. Taking existing plantations as a benchmark, farmers stated that yields³ of 20 Kg/tree using traditional agricultural practices, was frequent, and in exceptionally good seasons, yields could reach 30 Kg/tree.

16. **Farmers' perception of olive value chain.** Farmers were well aware of the concept of value chain and its potential to improve income derived from olives and olive products. They were also fully aware of the modern olive processing units (OPU) and of the fact that the sooner the olives reach the OPUs the better it is for getting good quality oil and higher prices. Crushing olives in traditional presses at the village level is for them the last resort they revert to in absence of timely transportation at reasonable cost, or when small quantities are involved.

17. **Improved agricultural practices.** Farmers stated that apart from few members of the associations who went on study tours, the project did not carry out well-structured thematic and regular farmers training. Nonetheless, farmers think that the proposed agricultural practices are useful. Very few farmers practice these techniques in the field, with the exception of preparation of tree basins, especially in their well-established plantations. Farmers thought that they would rather use what worked for them and their ancestors. Farmers also stated that IAP require a sizable amount of working capital which is not readily available, the alternate bearing of olive trees rendered the use of IAP a risky business. The lack of appropriate infrastructure and inheritance system are all factors that act as an obstacle in investing in IAP.

Non-beneficiary Focus Groups

18. Most of non-participants in the project present in the focus groups were agro pastoralists and owners of well-established olive tree plantations. Their refusal to partake in the project is partly due to the lack of consistent and clear information⁴. Regarding the project. Farmers also felt that more olive plantation may result in high postharvest losses and/or collapse of prices olives which may constitute reduction in gross margins⁵. The most important reason however, was that non-participants were

³ This was validated by the research results of TC 1/B

⁴ It appeared that there was confusion with Maroc Vert, which is a voluntary Private Public Partnership between the farmers, the government and a third party where the Government and the third party share the investment cost and the farmer and the third party share the revenues over a specified period before the farmer will have the right to his land.

⁵ This concern was also voiced by project FG. Their fear is not so much the price as much as it is connected with the logistics. Large harvest is difficult to manage particularly in areas with poor infrastructure

not ready to sacrifice cereal production and grazing even during the first two years of the project (which was the initial participation condition of the project).

Direct observations

19. Direct observation visits were carried, to perimeters that were handed over to the participating farmers⁶ and to perimeters where maintenance is still underway. It should be noted that due to time constraints only two perimeters in this category were visited. There are several aspects that are common between ceded and non-ceded perimeters; (i) the general state of accessible plantations is acceptable, but not as good for those that are not easily accessible; (ii) In both types, mulching is in general of insufficient quantity and quality, whereby stakes are made of cane, which is inappropriate material for this purpose. They are poorly installed and are not strong enough to resist even moderate winds; (iv) most SWC works are destroyed by tractors, harvesters or traditional tilling using draught animal power; this is also the case in some of the perimeters that have not been handed over to the beneficiaries for intercropping; (v) tree mortality and illicit grazing are not an issue in perimeters that are still under maintenance but they are in those perimeters that have been handed back to the farmers.

ECONOMIC AND FINANCIAL ANALYSIS

WORKING ASSUMPTIONS

20. The assumptions discussed here, are of direct relevance in the calculation of the FRR and ERR. These include: the project area, cropping patterns, yields, input and output prices, and investment costs.

21. **The project area** has been reclassified⁷ into two relatively homogeneous zones, Zone A and Zone B. The average annual rainfall in Zone A is less than 450mm (350- 450). The total planted area used for the assessment 3651 Ha in zone A and 57053 Ha in zone B. The weighted average of about 1.56 Ha per beneficiary. These figures and proportions are adopted in the economic and financial analysis.

⁶ Including land parcels of members of focus groups who complained about high tree mortality rates

⁷ See Baseline Survey 2010.

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22. **Cropping patterns** .The adopted pattern was based on the prevailing cropping patterns⁸ in Zone A and Zone B which is dominated by cereal cultivation, which occupies between 75% and 80% of the cultivated land, followed by legumes between 15% and 18% and forage and other crops between 3% and 10%.

23. It is assumed that in the “without” project situation farmers will continue to use their entire parcels for cultivation of cereal. 96% of the land parcel to be used for intercropping in the first 5 years, 91% in the second 5-year period and 84% from year 11 onward. Wheat, beans and vetch were selected as representative of cereal, legumes and fodder crops respectively⁹.

24. The number of olive trees planted by the project is assumed at 102 trees per hectare¹⁰ three varieties have been planted, Picholine Marocaine, Menara and Haouzia at a ratio of 40:30:30. According to the INRA this variety mix has several benefits: (i) reduction of the incidence of the alternate bearing phenomenon; (ii) an increase in the overall yields; and (iii) decrease in the incidence of certain diseases; and (iv) most importantly an increase in the overall oil content.

25. The weighted average yield under traditional agricultural practices scenario is estimated to reach 1.57 MT/Ha at full development, (taking into account effects of Alternate Bearing)¹¹, while the yield under improved methods, is estimated at 2.15 MT/Ha. The variety mix described above, is expected produce higher oil content equal to 23%. It is assumed that the project will produce two types of olive oils, Ordinary Virgin Oil and Extra Virgin Olive Oil; their default shares are set at 75% and 25%, respectively. No allowances were made for tree mortality rate or poor maintenance of SWC works. Economic prices for cereal crops were based on CIF prices of French wheat. Financial prices were those quoted by farmers and validated during field visits.

26. **Project Life.** A 20-year Project life has been assumed for the economic analysis to account for the phasing of the project costs and benefits.

27. **Standard Conversion Factor (SCF).** Project inputs and outputs traded are valued at their respective market prices, and agricultural goods are expected to

8 Base line survey and field visits

9 Baseline survey

¹⁰ Although this number in some earlier plantations were set at 120 trees per hectare, but the number of hectares under this system is negligible.

¹¹ Les études de faisabilité du contractant TC1A /B pour le projet PAF ont rapporté des rendements moyens d'environ 20kg/arbre dans les zones montagneuses chez des arbres adultes conduits traditionnellement

move freely within the project area in response to market demand. To adjust the local content of costs and goods assumed to be non-traded, a SCF used in economic analysis, with no foreign exchange premium.

28. **Opportunity Cost of Labor.** The opportunity cost of unskilled labor was assumed to be MAD 64 per day, a figure representative of daily agricultural wage during peak season. A SCF of 0.80 has been used for the financial wage rate to reflect the economic value of the labor and the seasonal variations in employment opportunities.

29. **Adoption Rate.** The adoption of Improve Agricultural Practices (IAP) under the project is divided into two types. First are those that have been implemented for all the planted areas independent of the participating households. Such IAPs include the introduction of improved olive tree varieties, appropriate planting techniques in terms of spacing, planting along the contour lines, and construction of SWC works etc. Second are those that were introduced by the project during operation and maintenance in the second year, and are assumed to be taken up by the beneficiaries immediately after the hand-over of the plantations back to them by the project. These include appropriate soil works, mulching, pruning, treatment, fertilization and use of appropriate harvesting technique etc.

30. **Investment costs.** Total investment costs of the Sub-project were estimated using actual disbursements expressed in local currency. These expenditures were organized on a yearly basis and by type of expenditure. When disaggregated actual data was unavailable, actual aggregated data was disaggregated proportionally using the share of total cost of the Sub-project in the total cost of the whole Fruit Tree Productivity Project (FTTP).

31. **Livestock.** It is assumed that the real loss to the smallholders as a result of the project is the income forgone from non-grazing of the after-harvest stubbles. Since fallow is not practiced, due to the small size of the holdings, income forgone from fallow grazing is set equal to zero.

RESULTS

POVERTY FOCUS

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32. **Project beneficiaries**, The targeted population of the project covers more than 1,000 villages in 13 provinces. About 53,858 households¹² benefited directly from the newly established fruit tree plantation in 82,630 Ha (both MCC and GoM financed). About 80% of the area planted was in eight of the provinces with the highest incidence of poverty. Nearly 80% of the participating households benefited from 83% of the plantations, and 90% of the plantations were equal or less than 2 Ha.

33. It is to be noted that the national average poverty level in 2007 was 9%. What can be concluded from the above is that area based targeting shows that provinces with high incidence of poverty¹³ have been included in the project, Available data is insufficient to confirm that the selected villages are those with the highest rural poverty. Therefore the project poverty-focus targeting is not conclusive.

FINANCIAL ANALYSIS

34. The basic constant-price FRR was estimated at 22%.

35. **Intercropping** is a critical variable in this project. Without it the profitability of this project is seriously compromised. If the intercropped area is below 65% of the average planted area, the project is judged as unprofitable.

36. **Output prices** Any increase in the price of both types of olive oil will increase the rate of return in both IAP and TAP depending on the level of the yield.

37. **Operating variable cost** As expected, a decrease in the operating cost of olive production under IAP is associated with an increase in the FRR. If the operating costs of olive productions are decreased by 20%, farmers will switch from TAP in favor of IAP.

38. **Impact on Income and labor**. The project impact on participating household income is negative during the first 5 years, and positive from Year 11 onward. However, the weight of income derived from field crops is very important; it constitutes 162 % of the total income in the first five years, 50% in the second five years of the project, and 26% from year 11 onward. This confirms the importance of intercropping in the conditional profitability of the project. The average income per

¹²These figures are for both MCC and GOM financed parts; the beneficiaries for MCC-funded plantations and the associated number of beneficiaries are 60704 Ha and 39566 beneficiaries respectively.

¹³ The relevant figures should be rural poverty and not total poverty, has rural poverty been used as a comparator, the results would be different.

household at full development from the newly established plantations and from field crops is expected to be around MAD 22467 / year, 76% from olive plantations and 26% from field crops. Return to labor is expected to be around MD 4028 of which 25 % will go to family labor.

ECONOMIC ANALYSIS

39. The basic constant price ERR was calculated at 12.2%.

40. **Intercropping** as we have seen in the financial analysis, intercropping is a determinant variable because of technical factors associated with cultivation of fruit trees in general and olive trees in particular. Olive trees under this project have been planted in a staggered way with the bulk of the plantations affected in 2011 -2013. The financial income stream shows clearly that income from olive plantations is negligible in the first 5 years and part of the second 5 years. While field crop income is fairly stable and important in value. Furthermore, in the “With Project” situation the inter-cropping area with field crops has not decreased significantly during the first 10 years and, therefore, the weight of the income stream generated by field crop cultivation during this critical period in the economic analysis affects the ERR in a very significant way. Setting the intercropped area to Zero the ERR declined to 5.9 %.

41. **Improved Agricultural Practices.** IAP would be adopted by participating farmers at higher olive yield level, higher prices and significant reduction in the operating costs. Intercropping would still be used even if IAP are adopted at least for the first 10 years of the life of the project.

42. **Output prices** Any increase in the price of both types of olive oil will increase the rate of return in both IAP and TAP depending on the level of the yield. But again the TAP outperforms the IAP. The same cannot be said about the change in the yield or price of cereals. Any increase in the price and or area cropped decreases the ERR.

43. **Employment creation under the Project.** It is estimated that each hectare of land that was developed and planted used a minimum of 54 man-days /Ha in the first year and 36 man-days /Ha in the second year, generating the equivalent of 5.6 million man day-days of employment opportunities over a period of 5 years of project implementation. This excludes wages and salaries paid to unskilled and semi-skilled laborers in the supporting sectors such as machinery operators, transport service providers, nurseries, as well as salaries paid to highly skilled personnel such as engineers, mangers, foremen and supervisors. Total wages paid by the project for unskilled labor is estimated at about USD 50 million, all of which was injected in the rural area, giving a real push to the rural economy, creating a dynamic economic environment leading in turn to increased real demand for goods and services, and higher economic activities. A good portion of the remaining 50% of the funds disbursed by the project was spent on the procurement of capital goods, payment of interest and service charges on borrowings, salaries paid to contractors’ top management and technical staff, and profit and taxes. Tree planting activities under the Project are labor intensive and hence expected to generate additional seasonal but permanent employment opportunities and casual labor along the value chain of fruit trees (i.e.

pruning, treatment and harvesting, transportation services and transformation). It is estimated that at full development, an average of 4700 to 5000 permanent seasonal employment opportunities would be created annually.

CONCLUSIONS, AND CHALLENGING QUESTIONS

IMPACT OF THE PROJECT

44. **Income** The expected impact of the extension activity on the target group is likely to be positive both in terms of income, food security and poverty reduction. The income from newly established plantations will start to accumulate very slowly until it stabilizes at a fairly high level from year 10 onward. The income deficit during the first 5 years or so is compensated for by income from intercropping of field crops. From year 5 to year 10 income derived from olive plantations is likely to turn positive and the overall situation of the participating farmers will start to show a significant improvement. From year 10 through to year 20. In terms of the project's impact on **food security**, there is no doubt that without intercropping, food security of the participating farmers would have been seriously threatened. At full development, and thanks to newly established fruit trees, the food security of the participating households is likely to be enhanced further.

45. **Employment** The project has directly generated over the 2009-2013 period the equivalent of 5.6 million man day-days of employment opportunities. Tree planting activities under the Project are labor intensive and hence expected to generate additional seasonal but permanent employment opportunities directly associated with the value chain of fruit trees. It is estimated that at full development, an average of 4700 to 5000 permanent seasonal employment opportunities would be created annually.

FINANCIAL AND ECONOMIC ANALYSIS

46. **Financial Analysis** Thanks to investment support and intercropping, the project is financially viable. The basic Financial Internal Rate of Return (FRR) at constant prices is estimated at 22 %. The FRR is sensitive to intercropping. Any decrease in the area dedicated to intercropping reduces the FRR. Higher adoption rate of Improved Agricultural Practices will cause the FRR to increase only at higher yield levels, and/or, lower operating cost and/or higher prices.

47. **Economic feasibility** The basic constant price Economic Rate of Return ERR was calculated, at 12.2%. The ERR responds in the same fashion as the FRR, to changes in the intercropping rate, IAP adoption, changes in operating cost of the outputs and changes in yields. Increases in field crop prices tend to lower the ERR. Adoption of IAP at lower yield is not attractive; the ERR increases with higher adoption rates of IAP.

ENVIRONMENTAL IMPACT OF THE PROJECT

48. No attempt has been made to calculate the ERR with environmental costs and benefits incorporated in the analysis for a number of reasons; lack of accurate information regarding potential costs and benefits to the environment in the “With project” and the “Without project” situations; most of the soil and water conservation works that have been constructed in nearly 45% of the area planted have not been welcomed by farmers and are likely to disappear overtime; and most importantly, intercropping which is considered as one of the main sources of soil erosion has been included in the estimation of the project ERR both in the situation WP and WOT.

CHALLENGING QUESTIONS

PROSCRIBED GRAZING

49. The rate of return was calculated on the assumptions that success rate is set at 100% throughout the life of the project. The reality, as witnessed during the intensive fieldwork to 7 provinces and 14 undertaken by the mission, shows something different. The state of the plantations is not as good as it should be and the mortality rate of the trees is certainly not Zero.

SOIL AND WATER CONSERVATION WORKS

50. About 60% of the planted areas have benefited from soil and water conservation works consisting of the construction of impluvia above the basin of the tree along the contour lines. The total cost of this is between USD 250 and USD 300/ Ha, about USD 9 and USD 11 million or about 10% of the total land development cost. The rationale for including these measures was to reduce soil erosion by 60%. While the cost of these measures was included in the project’s total cost, after the re-scoping of the project in 2010, the benefits have not been accounted for.

51. The post-completion status of the project has not changed very much in comparison pre-project state. Given that the farmers continue to cultivate field crops between the rows and the lines of the newly planted fruit trees, using traditional tilling (up and down the hill) practices and the impluvia that have been constructed by the project are gradually tilled away.

AGRICULTURAL PRACTICES

52. Farmers have inherited these plantations together with the husbandry techniques that came with it. Manure is used from time to time, the preparation of the tree basins is done when the land is tilled for field crops, and mineral fertilizers are not used directly for the trees but indirectly through fi fertilization of field crops. Harvesting is manual using mostly family, hired-labor is used when production is abundant. They are fully aware of the IAP, but they think their use is risky.

INTRODUCTION

53. The focus of the **Terms of Reference (TOR)** of this assignment is primarily on economic and financial assessment of one specific activity of the Fruit Tree Productivity Project, namely the “Extension of fruit tree plantations to the hillside areas dominated by traditional cultivation of cereal crops under rain fed condition”.

54. The previous assessments were completed either before the start up of the project and before its re-scoping, or at early stages of its implementations. The first one estimated the ERR for the FTTP project as a whole and reached a conclusion that the project is economically viable; the rate of return was estimated at 24%. The second assessment was concerned with the extension activity only and was carried out as a response to the re-scoping of the Project, where per hectare land development cost was increased, and planted area reduced; the Economic Internal Rate of Return was estimated at 10.4%.

55. The present exercise on the other hand, is commissioned by APP/MCC to take the outcome of the previous exercises as the starting point, revise the assumption made therein, in light of actual situation in terms of outputs achieved and likely outcomes to be realized, and fine-tune the assumptions about the unobserved variables such as the yields and production costs.

56. Considerable amount of information has been generated during the period (2008-2013) with respect to inputs used and outputs generated. The baseline survey fine-tuned the data about the project area and the farming system, periodic impact assessments and thematic studies generated interesting information regarding performance and impact indicators at different levels of the objective hierarchy of the project. Land development costs estimates for planted areas are based on actual data are fairly accurate estimate.

57. In view of the above and taking in to account this considerable amount of available information combined with, long series of discussions with experts and consultants, intensive interviews of the farmers, and direct observations of the perimeters, the approach of the present exercise has focused on three aspects that are of crucial importance to the economic and financial impact assessment of the project. (i) The role and the significance of cereal crops in the livelihood of the smallholders in the project area; (ii) the motivation of the smallholder to switch from traditional agricultural practices (TIP) being used in fruit tree husbandry to improved agricultural practices (IAP); and (iii) the willingness of the smallholders to internalize wholly or partly the cost associated with the protection of the natural resource base.

58. Better understanding of the role of each of the three aspects above, individually or together, might contribute to a better understanding of some of the weaknesses and strengths of the project design, and/or its implementation approach, its exit strategy and sustainability of its results.

PROJECT BACKGROUND

59. **The Program.** On August 31, 2007, the Government of Morocco (GoM) and the Government of the United States of America, represented by the Millennium Challenge Corporation (MCC), signed a grant agreement (GA), the Millennium Challenge Compact MCC (The Program). The goal of the Program is to reduce poverty through economic growth by increasing productivity and improving employment in sectors with high growth potential, namely, the agriculture, handicrafts, and small-scale fishing sectors. Its interventions are intended to support activities affecting the local, regional and national economies and aim at accelerating economic growth by encouraging private investments, increasing employment and income whilst expanding domestic and export markets. The Program's implementation was managed by the Agency of Partnership for Progress (APP); APP has the legal status of public organization with managerial autonomy. It is administered by a Strategic Steering Board presided over by the Prime Minister. The Program was composed at the design phase of five projects with a total cost of USD 697.5 million this excludes the contribution of the Government of the Kingdom of Morocco (GoKM): (i) Fruit Tree Productivity (USD 338.7 million), (ii) Small-Scale Fisheries (USD 120.1 million), (iii) Artisan and Fez Medina (USD 95.5 million) (which includes the Functional Literacy and Vocational Training Activity), (iv) Enterprise Support (USD 42.6 million); and (v) Financial Services (USD 42.6 million). The remaining funds (USD 58 million) will be used for program implementation and monitoring and evaluation. The implementation arrangements of each project has been worked out in accordance with Implementing Entity Agreements, concluded between APP and the concerned implementing entities.

60. **The Fruit Tree Productivity Project (FTPP)** is the largest project of the program; Its Strategy calls, among other thing for: (i) increased and diversified agricultural production; (ii) increased opportunities for agricultural employment and income; (iii) halting of the process of environmental degradation of human origin; and (v) improvement professional training and capacity building of farmers and their associations and cooperatives. The overall goal of FTTP and its components is to accelerate economic growth of the rural economy and alleviate rural poverty particularly for subsistence smallholders who practice traditional rain-fed agriculture (mainly cereals). The main specific objective is to increase agricultural income and reduce its variability by replacing cereals (particularly wheat for which Morocco is not competitive on the international market), with commercial tree crops, where there lies a natural competitive advantage for Morocco. The Components of FTTP include: (i) the intensification and extension of fruit trees; plantations in the rainfed areas; (ii) irrigation and intensification of olives; (iii) irrigation and intensification of date palms; and (iv) put in place " Support services" for the targeted value chains, consisting of provision of specific professional training, creation of a scientific Board, to carry out appropriate market search studies, and specific thematic studies pertaining to agro-industrial research and development , gender mainstreaming, improved access to micro credit and creation of job opportunities for the young. The Ministry of Agriculture and Marine Fisheries (MAMF) has the overall responsibility for

project implementation. The project has a separate PMU, which works closely in collaboration with the relevant services, at the central level through the different departments of the MOA and at the field level with DPA and ORMVA of. PMU is assisted Technical Assistance Groups who provide technical support and supervision of land development works.

61. To revitalize early investment in the targeted value-chains with the view to enhancing FTTP's benefits to farmers and assure sustainable market linkages, a Catalytic Fund (CF) was established to provide grant funding to partly compensate businesses for the perceived risk of building commercial relationships with Project farmers. The CF was set up to complement FTTP supply-side efforts through a Public Private Partnership (PPP) to develop business linkages with producers and promote processing into higher-value finished products (higher quality olive oil). The CF offers a 50% subsidy to new olive crushing units constructed and equipped by an Apex producers' organization. The remaining 50% is co-financed as follows: A 10% subsidy from the Agricultural Development Fund, a 30% bank loan from the Credit Agricole du Maroc (CAM) and 10% contribution from beneficiaries.

62. **The FTTP Area** covers dry land areas and small scale irrigated perimeters including date palm oasis in 25 provinces. The project was expected to reach over 100000 households at full development. The total cost of the project, at design stage, was estimated at USD 339.99 million of which USD 261 million for land development, 20.74 million for Catalyst Fund, and the remaining was earmarked for training and capacity building, Technical assistance Monitoring and Evaluation, and administration. As of July 2013, About USD 327.63 million was committed and 267.41 million was disbursed representing 79% of the total project cost.

THE EXPANSION ACTIVITY

Since this assignment is concerned with the rainfed fruit tree expansion sub-activity, the word "Sub-project " will refer to the expansion sub-activity of the Fruit Tree Productivity Project (FTTP), while the acronym FTTP will be used to refer to the entire Fruit Tree Productivity Project.

63. **The Project** (Expansion Activity) intervention area extends over 158 perimeters in 17 provinces where, according to the original project document, 100,000 Ha were to be planted with olive trees, fifteen thousand hectares (15000 Ha) with fig trees and 5000 Ha with Almond trees. The original strategy of the project was for these planned plantations to replace a cropping system dominated by cereal cultivations. The project area is in major part hilly where the gradient varies from 5% to 30% the target group of the extension activity consists of poor smallholders practicing mainly cereal cultivation. The average size of their land holdings is about 3 hectares; the majority are fragmented and eroded due to their location – in sloping areas- and to the inappropriate agricultural practices. Yields of cereals are low and highly variable.

Kingdom of Morocco: Fruit Tree Productivity Project –The Extension Activity

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64. **Project status and major amendments** In 2010, FTTP was restructured when it became clear, on the basis of pilot contracts, that actual per hectare land development cost under the expansion activity, if soils, would be much higher than originally estimated¹⁴, due primarily to considerable amount of Soil and Water Conservation Works that was required but not accounted for. Consequently, the area to be planted was scaled-down from the target of 120,000 Ha to 80,000 Ha of which 62,000 Ha was programmed for funding by MCC and the remaining 18,000 Ha for funding by the GoM¹⁵. The revised IEER was estimated about 12.2%.

65. **Cost and financing.** The direct cost of planting about 60700 trees as of July 2013 was approximately MAD 852 million or the equivalent of USD 103.2 million, an additional amount of MAD 196 million or the equivalent of USD 23.75 million total cost was also disbursed to pay for technical assistance, research, administration, monitoring and evaluation and contingencies While these figures are based on actual expenditures, they remain preliminary and can only be finalized when the grant account is completed and the project accounts are closed. These costs have been utilized for the estimation of the FRR and ERR.

66. **Targets, benchmarks and expected results.** The first pilot tree-planting contract was signed only on Feb 2009, eighteen months after the signing of the Compact Agreement. The total area planted under MCC funding as of July 2013, was about s about 60704 Ha of which, 57814 Ha was planted with olive trees and 2890 Ha with almond trees. About 27177 ha of planted area were accompanied with Soil and Water Conservation works. Direct beneficiaries of the Rain-fed Olive, Almond Tree Expansion sub-activities are estimated at approximately 38000 households

ASSESSMENT METHOD AND LIMITATIONS

¹⁴ The revised estimates including soil and water estimates of a per hectare land development cost was about 54 % higher than the original cost estimates

¹⁵ Reallocation of the equivalent of about USD 40 million from (Makina) of the Fes Medina project to the FTTP

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67. This assignment has been completed in two stages, the first stage was for data collection and validation and the second stage was reserved, data analysis, formulation of the assumptions, for computational work and analysis of the result and drafting of the report.

68. The first stage was implemented in the following sequences; (i) desk work at the APP headquarters where the basic project documents¹⁶ were reviewed and a series of discussions and interviews involving key project officials, and senior staff of the lead ministry, consultants, TA providers, and academics, were carried out¹⁷; (ii) preparation and adoption of the methodological note; and (iii) visits to the project area was carried combining farmers' Focus Group discussion with direct observation to a randomly selected perimeters

69. The second stage was completed in consultative process with different project partners, staff of the APP, PMU, Technical assistance providers, and MCC and colleague consultants

70. The data collection process employed three different sources. Firstly, official records, publications, reports, thematic studies and all other relevant project-produced documents. Second, focus group discussions with project beneficiaries and non-beneficiaries, and, finally direct field observations.

71. Three categories of focus farmer groups were selected and interviewed. Each group was composed of six to eight farmers. Total 12 focus groups sessions have been convened. Focus groups have been selected from the same perimeters that have been visited by mission. The perimeters have been chosen randomly from the completed and handed-over perimeters to the smallholders.

72. The questions that were discussed in the focus group were limited to four each of which was allocated between 20 to 30 minutes. The four questions focused on: (i) Coping strategies before and after the tree plantation, and how would they manage this situation until the fruit tree production has reached an acceptable level; (ii) degree of satisfaction with the plantation in terms of the quality of work done, success rate and general status of the trees; (iii) practicality and usefulness of improved agricultural practices; and (iv) awareness about the role of SWC works and (as promoted by the project);

¹⁶ See Appendix xxx for the bibliography of the documentations consulted

¹⁷ See Annex xxx for the list of the people met

73. **Direct observation** was an important part of the fieldwork; it provided first-hand information regarding the consultation process involving the project, the beneficiaries and the contractors, specifically: (i) it revealed the strengths and weakness of participation process of farmers during the planting and operation and maintenance phases, and the relationship between the contractors and farmers; (ii) put in perspective the farmers' satisfaction with the quality and quantity of the completed works; and (iii) identified the issues that are likely to arise after the handover, particularly with respect to sustainability of the plantations and in particular the water and soils conservation works. The farmers' parcels that were visited were identified during the focus group discussions from among the selected perimeters listed in table 4 above.

Informants' interviews consisted of a series of consultations and interviews with the DPA officials, CT supervisors and representatives of the TA groups, particularly for elucidation of issues raised and validation of some collected information from the farmers, the local souks and input merchants.

74. **Secondary sources.** The required quantitative data was collected from reliable sources such as the official statistical year books of the MoA, the M&E database of the project, periodic PMU's and APP's supervision and follow-up reports; Baseline survey of 2010 of 2010; follow-up impact surveys for 2011, 2012 and 2013¹⁸; thematic studies of the value chain of table olives and olive oils; and technical parameters. MCC guidelines, appropriate publications and statistical records related to development work of MCC, USAID, WB, FAO, IFAD, and other bilateral and multilateral donors have been consulted as needed.

75. Qualitative/quantitative data generated from and validated by different sources, together with the outcome of the field work, different consultations and interviews have been employed in the formulation of the working assumptions of the assessment exercise regarding:

- a. Fine-tuning the yields estimates of olives and almonds, labor requirements and input use;
- b. Elaboration of cropping patterns, and crop budgets;
- c. IAP adoption rate, and coping strategies
- d. Actual direct and indirect investment costs by year
- e. And design of the different sensitivity tests and switching value to establish the robustness of the estimated FRR/ERR IRRs.

FINDINGS CONCLUSIONS AND LIMITATION

FIELDWORK

¹⁸ Will also be consulted if made available to the mission

76. **Coping strategy.** Practically all participants in the FG discussions considered cereal cultivation before and after the project very important activity. This practice triggered by farmers' dependence on cereal, legumes and fodder crops predominantly for food security and as a source of badly needed liquidity for urgent expenditures. Intercropping is stopped only when field crop production becomes impractical and or non economical. Farmers who own old olive tree plantations explained that some benefits of intercropping are the land tilling which facilitated rain infiltration and the fertilization intended for field crops also benefitting trees. Tilling and harrowing is done both horizontally along the contour lines and vertically. Farmers complained that the staggered tree planting technique constituted a problem because it rendered the land tilling using agricultural machinery both cumbersome and time consuming. .

77. Farmers' satisfaction with the land development work. As many, if not all members of FGs, have existing tree plantations, they expressed strong support of the project and it is importance to them because of the potential expected income at full development. However they expressed serious concerns regarding the uncontrolled grazing by non-participants that caused considerable and permanent damage to the plantation.

78. Farmers' expectations in terms of yield and income. A number of ideas were tossed around: (i) some farmers felt that they are unlikely to exploit the olive value chain to its full potential; (ii) the incremental production is likely to be sold on the tree either for pressing need of funds or due to lack of access to market; (iii) nearby olive value units presses; (iv) financial service. As a diversification and risk management strategy, intercropping was raised again by farmers who felt the need to continue intercropping until their plantations have entered into full development where a reasonable and guaranteed income allows them to compensate for loss of income from cereals. Most farmers stated that they would continue to intercrop even when the trees become fully matured. Taking existing plantations as a benchmark, farmers felt that yield in the neighborhood of 20 tons / ha is possible and in exceptionally good seasons that figure could be multiplied by a factor 1.5. When talking about yields, farmers always refer to yields per tree. Farmers tend to remember exceptionally good and bad years. Regular maintenance of financial records and accounting are not in practice.

79. Farmers' perception of value chain of olive Farmers are well aware of the concept of value chain and its potential if exploited properly to help them maximize income derived from olives and olive products. All farmers are fully aware of the modern Olive Processing Units (OPUs) and will not hesitate to use them if they are accessible at a reasonable cost. Farmers recognize, therefore the importance of appropriate and timely transportation of olives to the nearby OPUs. Farmers were fully aware of the fact that the sooner the olives reach the OPUs the better it is for getting good quality oil and higher prices. Crushing olives in traditional presses at the village level is still practiced when transportation is not available, or when small quantities are involved. Most farmers keep between 50 and 100 liters of olives for auto-consumption purposes. Although, farmers are not aware of organic agriculture, cooperatives and associations are.

80. **Improved agricultural practices.** Most farmers felt that the training offered by the project was not enough and those who received some training did not act as contact farmers to benefit others. While farmers think that the proposed

agricultural practices are useful, very few farmers practice them in the field. There is a preference to stick with agricultural practices that they feel have worked for generations. Furthermore, new practices require working capital, which is not readily available. The inheritance system acts as an obstacle in investing in modern agricultural practices. Absentee owners are interested in picking up their share of the harvest at a minimum cost. The larger the number of inheritors, the smaller is the chance that improved practices will be utilized.

81. **Non-beneficiaries Focus Groups.** Members in these groups have a similar profile as members of the beneficiary groups. Most of them were agro pastoralists who also own well-established olive tree plantations. Those who declined to participate in the project felt that the information regarding the project was not clear. The Private Public Partnership approach promoted by MCC-funded project, was confused with that of Maroc Vert (MV)¹⁹. They also felt that more olive plantation may result in high post-harvest losses and/or collapse of prices which may constitute serious reduction in gross margins²⁰. Had Non-participants opted to participate in the for project, they would not have been ready to sacrifice cereal production and grazing even during the first two years of the project (which was the initial participation condition of the project),

82. **Direct observations** visits were carried out in the selected perimeters described in the Methodological Note (MN) those that were handed-over the beneficiaries, and those that were still under operation and maintenance .The issues and problems that were raised by the focus group were classified into two categories, Systemic and Sporadic issues. Systemic types refer to those issues or problems that were universally recognized in all FGs and did not raise any significant objection neither from FG members nor from the CT/TA representatives. The Sporadic types are those issues that did not generate any objections but did not appear to be frequent enough to be classified as systemic. There are several aspects that are common between ceded and non-ceded perimeters: (i) the general state of the accessible plantations is acceptable, the state of those plantations that are not easily accessible is not as good; (ii) mulching in general is of insufficient quantity, stakes are made of cane, which is inappropriate material to be used as for this purpose, as it is not strong

¹⁹ Which is a voluntary Private Public Partnership between the farmers, the government and a third party where the Government and the third party share the investment cost and the farmer and the third party share the revenues over a specified period before the farmer will have the right to his land.¹⁹

²⁰ This concern was also voiced by project FG. Their fear is not so much the price as much as it is connected with the logistics. Large harvest is difficult to manage particularly in areas with poor infrastructure

enough and does not resist strong winds, and (iv) most SWC works are destroyed by tractors during land preparation for intercropping.

83. The problems confronted in the perimeters that were handed-back to the beneficiaries are significantly more important because of lack of farmers' follow-up. Farmers are unaware of the number of trees that have been planted in their parcels, they are not sure of the mortality rate, mulching is not monitored, most of the stakes have disintegrated, tree basins are not maintained, and pruning is not carried out. Tree mortality is an issue that cannot be overlooked. It is difficult to come up with accurate estimate for the entire project, for the perimeter visited it is easily situated between 5 to 10 %.

84. **Data collection and validation.** The process was iterative; farmers were consulted to provide initial inputs with respect to key parameters such as yields, input and output prices, and cropping patterns. This process was often carried out in presence of CT supervisors who participated in the discussions and provided their observations until a consensus is reached. PMU and the TA providers validated these estimates later. The mission collected the input prices of different inputs and outputs in the local souks, which were also validated through published prices of the MAMF.

85. In an effort to estimate the employment opportunities provided by the project, the mission interview CT supervisors, and TA representatives as well as farmers themselves who worked as laborers in the establishment and maintenance phases of the plantations. These figures were validated through the UGP before they were adopted. These estimates and calculations are presented in the next section.

ECONOMIC AND FINANCAL ANALYSIS

86. This chapter is divided into three sections, in the first section, the working assumptions are postulated and discussed; in the second section the methodology and the results of the financial and economic analysis are presented and examined; and the third section provides a summary and conclusion of the assessment exercise and its implications on the design and implementation of future projects. Limitations and shortfalls of the assessment are reviewed.

WORKING ASSUMPTIONS

87. The assumptions discussed here, are of direct relevance to the calculation of the FRR and ERR. These include: the project area, cropping patterns, yields, input and output prices, and investment costs. There are additional assumptions that have been added to reflect the outcome of the field visits, these relate to tree mortality rate, soil and water conservation works, and impact on the environment. These will be briefly discussed at the end of the section.

88. The project area has been reclassified into two relatively homogeneous zones, Zone A and Zone B. The average annual rainfall in Zone A is less than 450mm (350- 450), while average annual rainfall in Zone B exceeds 450 mm (450mm - 1000 mm).

89. As of August 2013, the total area planted under MCC funding, was approximately 60 704 Ha. Approximately 90% of the planted area has been handed back to beneficiaries, the remaining 10%, which is still undergoing maintenance works, is expected to be handed back to the beneficiaries in batches, over a period of extending from Sept 2013 to December 2014. About 6 % (3651 Ha) of the area planted was in Zone A, and the remaining 94% (57053 Ha) was in Zone B. The average area planted per beneficiary in Zone A and Zone B was 1.36 Ha and 1.56 Ha, respectively. These figures and proportions are adopted in the economic and financial analysis.

90. Cropping patterns .The prevailing cropping patterns²² in Zone A and Zone B depend on the size of the landholding, the number of inheritors, the land fragmentation coefficient, and the importance of livestock in the household economy. Generally the cropping pattern in the project area is dominated by cereal cultivation, which occupies between 75% and 80% of the cultivated land, followed by legumes between 15% and 18%, and forage and other crops between 3% and 10%. (Table 1) below

²¹ See Baseline Survey 2010.

²² Base line survey and field visits

Table 1: Cropping patterns in the project area

Area cropped	Zone A	Zone B
Area cropped by cereal crops	79%	75%
Area cropped by legume crops	18%	15%
Area cropped by forage and other crops	3%	10%
Total	100%	100%

91. The cropping pattern in the “With project” and “Without project” situations will be derived from table 1 taking into account the percentage of land that will be occupied by the newly established tree crops under the extension activity of FTTP.

92. It is assumed that the area around the basin the tree, that should be subject to intercropping (to ensure easy access, proper maintenance and protection of soil water conservation (SWC) measures), grows in proportion to the size of the canopy of the tree). Accordingly, each tree was allowed 4 m² in the first 5 years, and 9 m² between year 6 and year 10, and 16 m² from year 10 onward. The remaining area for intercropping²³ from year 1 through to year 20. (Table 2). It is therefore assumed that in the “without” project situation the entire project area was used for the field crop

²³ According to the initial agreement between farmers and the project, the intercropping was not permitted in the first two years.

Table 2: Projected cropping patterns

Project Year	Percentage ²⁴ of land physically occupied by new plantation	Percentage Land to be reserved for intercropping	Total (%)
Y1-Y5	4%	96%	100
Y6-Y10	9%	91%	100
Y11-Y20	16%	84%	100

93. In the “Without “ project situation, the majority of farmers of Zone A and Zone B, practice three-year crop rotation involving cereals, legumes and fodder crops. The main cereal crops are wheat and barley. Legumes crops include lentils, chickpeas and beans. Fodder drops include peas and vetch. Wheat, beans and vetch were selected as representative of cereal, legumes and fodder crops respectively

94. The number of olive trees planted by the project is assumed at 102 trees per hectare²⁵. Three varieties have been planted, Picholine Marocaine, Menara and Haouzia at a ratio of 40:30:30. According to the INRA this variety mix has several benefits: (I) reduction of the incidence of the alternate bearing phenomenon, (ii) an increase in the overall yields, (iii) decrease the incidence of certain diseases, and most importantly (iv) an increase in the overall oil content.

95. Yields.²⁶ Olive yield estimates were based on the weighted average of the variety mix of 40% (Picholine Marocaine²⁷(PM) and 60% improved varieties (Menara

²⁴ These estimated were worked out in collaboration with Mr. B. Boulouha, Technical Advisor. His analysis concurs with the farmer’s behavior, which tries to maximize the area dedicated to intercropping. This also explains partially why Soil and Water Conservation works have been destroyed.

²⁵ Although this number in some earlier plantations were set at 120 trees per hectare, but the number of hectares under this system is negligible

²⁶ This section was revised based on suggestions provided by Mr. Belkassem Boulouha, Member of UNOPS TC1A/B Technical Assistance Group of the project.

²⁷ Planted extensively by rainfed smallholders in Morocco

and Haouzia). The weighted average yield under traditional agricultural practices scenario is estimated to reach at full development 1.57 MT/Ha, (taking into effects of Alternate Bearing) ²⁸, while the yield under improved methods, is estimated at 2.15 MT/Ha (Tables 3). This variety mix is expected to produce fruits with higher oil content, equal to 23%, which is significantly higher than that of the Picholine Marocaine, which is between 18% and 20 %. The alternate bearing index (ABI) is improved from 0.98 to 0.65, which reduces the variability of the olive production by 30%

96. It is assumed that the project will produce two types of olive oil, Ordinary Virgin Oil and Extra Virgin Olive Oil. Their default shares are set at 75% and 25% respectively. The evolution of the yield over the project years was expressed as a function of the DY. This was used to facilitate the implementation of the sensitivity scenarios and switching values. The progression of the yield over the life of the project in both scenarios is summarized in table 3. The figures in this table have been adjusted to reflect: (i) the effect of alternate bearing, and (ii) the type of agricultural practices based on the approach used under rehabilitation sub-component of the FTTP.

97. This Yield Evolution Parameter was adjusted further to reflect the progression of planted areas, before it was used for the calculation of the yield projection in the project.

98. Whilst the tree mortality caused by different problems, (poor planting and maintenance conditions, illegal grazing and careless use of agricultural machinery) is important, tree mortality was not taken into account due to lack of accurate estimations. Although the slope gradient has a direct impact of production and productivity of olive plantations, absence of data led to assume that the yield levels of all perimeters irrespective of the slope's gradient are the same. Moreover, while yield levels should differ depending on the location and agro climatic conditions²⁹ of the different perimeters it has been assumed that the one yield level represents the entire project area.

²⁸ Les études de faisabilité du contractant TC1A /B pour le projet PAF ont rapporté des rendements moyens d'environ 20kg/arbre dans les zones montagneuses chez des arbres adultes conduits traditionnellement

²⁹ According to the BS, there was no significant difference in the yield of olives Between Zone A and Zone B

99. **Prices.** Due to the fall in international wheat prices, and in an effort to protect the interest of cereal growers³⁰ in Morocco, the Government of Morocco (GoM) has imposed an import duty of about 46% and fixed the wheat reference price at the mills at MAD 2800 /MT.

Table 3: Evolution of olive yields

Year	ABI- adjusted Olive yield under (TAP)		ABI- adjusted Olive yield under (IAP))		Yield (as % of default yield)
	Kg/tree	MT/Ha	Kg/tree	Mt/Ha	
Y0	0.00	0.00	0	0.00	0.00
Y1	0.00	0.00	0	0.00	0.00
Y2	0.00	0.00	0	0.00	0.00
Y3	1.46	0.15	2	0.20	0.10
Y4	3.65	0.37	5	0.51	0.24
Y5	5.11	0.52	7	0.71	0.33
Y6	8.03	0.82	11	1.12	0.52
Y7	3.65	0.37	5	0.51	0.24
Y8	10.96	1.12	15	1.53	0.71
Y9	18.26	1.86	25	2.55	1.19
Y10	8.77	0.89	12	1.22	0.57
Y11	21.91	2.24	30	3.06	1.43
Y12	25.57	2.61	35	3.57	1.66
Y13	32.87	3.35	45	4.59	2.14
Y14	21.91	2.24	30	3.06	1.43
Y15	14.61	1.49	20	2.04	0.95
Y16	29.22	2.98	40	4.08	1.90
Y17	43.83	4.47	60	6.12	2.85
Y18	21.91	2.24	30	3.06	1.43
Y19	14.61	1.49	20	2.04	0.95
Y20	36.52	3.73	50	5.10	2.38

³⁰ Due to the exceptional agricultural season (2012/2013)

Average	15.37	1.57	21.05	2.15	1.00
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100. According to the International Grain Council (IGC) the FOB price of wheat at Rouen France (August 2013) is about USD 249/MT or MAD 2100 /MAD or CIF MAD 2450 to 2550. Farm gate prices quoted by farmers during the month of July 2013 are used as financial prices. Economic prices are the CIF prices of imported wheat delivered to mills. With respect to certified seeds, the financial prices are those paid by the farmers while economic prices are the market prices adjusted by the amount of subsidies

101. According to International Olive Council (IOC), the mid-year 2013 FOB price at Bari Italy is as follows:

Table 3: Olive prices

Quality of olive oil	Price Euro (MAD)
Refined Pomace olive oil:	Euro 2.00 (MAD 21.8)
Refined olive oil:	Euro 2.85 (MAD 31.01)
Extra virgin olive oil:	Euro 3.20 (MAD 34.82)

102. The average producers' olive price during the past 10 years was about MAD 4000/MT and that of olive oil (all categories aggregated) MAD 32/ Litre. According to a recent APP-commissioned study³¹, the average producer's financial price of olives produced under rainfed condition in the project area was estimated at about MAD 3000/MT and with a quality premium of about 12% bringing the price for premium quality olives to MAD 3360/MT. The corresponding financial prices of ordinary and extra virgin oils are about MAD 25 and MAD 28 per Litre. According to the same study, the economic prices of ordinary virgin and extra virgin oils at the press

³¹Analyse de la chaîne des valeurs des filières de l'olivier ... dans la zone d'intervention du projet, 2012

are estimated at MAD 2361 and MAD 2644 /MT or MAD 29.3 and MAD 32.7 per Litre respectively. These prices were used in the financial and economic prices.

103. **Labor wage rates.** As of July 2012, the SMAG (Minimum Guaranteed Agricultural Salary) in Morocco has been legally set at 63,39 DH. It should be noted that over the Focus Group discussions, framers complained about labor shortage. Market wage rate in the rural area has increased since 2007. Wages for unskilled labor are paid by farmers at the rate of MAD 60 /day and semi-skilled labor (pruning and treatment) at the rate of MAD 80 and MAD 110 per day. The corresponding economic wage rates are estimated, using the SCF for Morocco, at MAD 64/Day and MAD 88/Day for unskilled and semi skilled labor respectively. Family labor is valued at MAD 48/Man-day.

104. **Project Life.** A 20-year Project life has been assumed for the economic analysis to account for the phasing of the project costs and benefits.

105. **Standard Conversion Factor (SCF).** Project inputs and outputs traded are valued at their respective market prices, and agricultural goods are expected to move freely within the project area in response to market demand. To adjust the local content of costs and goods assumed to be non-traded, the SCF of 0.80 was used in economic analysis, with no foreign exchange premium.

106. **Opportunity Cost of Capital and Labor.** An economic discount rate³² of 10 per cent has been used which is high relative to returns to savings and adequate relative to the cost of borrowing. The opportunity cost of unskilled labor was assumed to be MAD 64 per day, a figure representative of daily agricultural wage during peak season. A SCF of 0.80 has been used for the financial wage rate to reflect the economic value of the labor and the seasonal variations in employment opportunities.

107. **Project Benefits.** The analysis attempts to identify quantifiable benefits and costs that relate directly to the fruit tree extension activity of the FTTP. The main quantifiable benefits of the Project interventions are increased fruit tree productivity³³. Other economic benefits accruing from the Project interventions, but not quantified, comprise viable enterprise businesses and rural jobs in the service sector and social benefits. These benefits were not quantified due to unavailability of

³² MCC suggested value for Morocco

³³ All olive produced was converted into Olive oil. Almond tree were not included into the analysis firstly because the area planted at about 2900 Ha represents barely 5%, and the difference in gross margins in two crops is very small and should not have any significant impact on the IRR. Financial analysis has been conducted for a typical plantation of 1.65 Ha.

reliable relevant data. Both costs and benefits were calculated in 2013 constant prices. Investment costs that were disbursed between 2008 and 2013 were adjusted for 2013 prices using the average inflation in Morocco during the period. Similarly the incremental costs and benefits for the same period were adjusted correspondingly.

108. **Benefits Estimation Procedure.** The incremental benefits stream comprises the economic net value of horticulture crop production. Incremental benefits have been aggregated based on the phasing of the area planted annually taking into account the crop mix composed of fruit trees and field crops.

109. **Adoption of Agricultural Practices.** Improved Agricultural Practices (IAP) adopted under the project are divided into two types; The first includes those that have been implemented for all the planted areas independently of the participating households, and these include: (i) the introduction of improved olive tree varieties, (ii) appropriate planting techniques in terms of spacing, (iii) plantations along the contour line, and (iv) establishment of SWC works. The second type includes those that were introduced by the project during operation and maintenance in the second year, supposed to be taken up by the beneficiaries immediately after the handover of the plantations back to them by the project. These include: (i) appropriate soil works, (ii) mulching, (iii) pruning, (iv) treatment (v) fertilization, (vi) use of appropriate harvesting technique (provision of stakes etc.).

110. **Investment costs.** Total investment cost of the project is estimated using actual yearly disbursements expressed in local currency. These expenditures were organized on a yearly basis and organized by expenditure categories. When disaggregated actual data was not available, actual aggregated data was disaggregated proportionally using the weight of the total cost of extension component in the total cost of the whole Fruit Tree Productivity Project (FTTP). It should be emphasized that these figures reflect the situation as of July 2013. All expenditures for investment and operating expenditures were expressed in local currency. Table 4 summarizes the actual investment by expenditure accounts. Which are divided into two categories. The land development costs, are the amounts paid directly to contractors (spread out by the date they were effectively disbursed), the remaining costs are divided proportionally between Technical Assistance, Research and Development, Compact Implementation Fund, Monitoring and Evaluation, and contingencies. The administration cost of the extension activity was estimated as a percentage of General Administration Cost of MCC program. Financial investment costs have been converted to economic costs using the SCF for Morocco. The residual value was assumed equal to

the total investment outlay. This a conservative estimate³⁴. The cost of the Catalyst Fund was not taken into account³⁵. The investment costs were also adjusted to 2013 prices. The same adjustment was applied to operating costs and benefits between 2008 and 2013.

Other Assumptions

111. For lack of accurate data regarding tree mortality rate for caused mainly by uncontrolled grazing, no adjustment to the area planted or total production has been made.

112. **Agricultural Practices.** Focus Group (FG) discussions revealed consistently that the efforts made by the project with respect to improved agricultural practices have not been effective; this was confirmed during direct observations of the plantations in the randomly selected 13 perimeters visited by the mission. An adoption rate has been taken into account in the analysis and its impact on the IRR tested.

113. **Livestock.** In the “Without” project situation, in addition to the cultivation of cereal crops, fodder and legume crops, most households maintain a couple of cows, a small flock of small ruminants and draught animals. Large ruminant are kept within the confines homestead or the village and fed wheat bran, concentrate, and hay, while the small ruminants graze in the after-harvest stubbles and /or on the nearby rangelands and fallow. Therefore the real loss to the smallholders as a result of the project is the income forgone from non-grazing of the after-harvest stubbles. However, since fallow is not practiced, due to the small size of the holdings, income forgone from fallow grazing is set equal to zero.

METHODOLOGY AND RESULTS

114. This section is divided into three parts. The first part deals with the assessment of the project targeting strategy and whether it has been effective in reaching the poor. This is necessary to assess the share of the poor households in the incremental benefits of the project. The second part discusses the objectives of the

³⁴ The value of a 20-year olive tree in the project area is estimated between a minimum of MAD 1400/tree and a maximum of MAD 3000/tree (2013-prices).

³⁵ According TC5 A/B, the total cost of the Catalyst has been included in the calculation of the IRR for the Rehabilitation sub-component.

financial and economic analysis, clarifies certain assumptions, and presents the results. The third part provides a summary, a conclusion and articulates the limitations of the assessment exercise

115. **Project beneficiaries**, The targeted population of the project covers more than 1000 villages in 13 provinces. About 53858 households³⁶ benefited directly from the newly established fruit tree plantation in 82630 Ha (both MCC and GoM financed). About 80% of the area planted was in eight of the provinces with the highest incidence of poverty. Nearly 80% of the participating households benefited from 83% of the plantations and 90% of the plantations were equal or less than 2 Ha. (See Fig 1 and 2 and table 5).

116. It is to be noted that the national average poverty level in 2007 was 9%. What can be concluded from the above is that area based targeting shows that provinces with high incidence of poverty³⁷ have been included in the project. Available data is insufficient to confirm that the selected villages are those with the highest rate rural poverty. Therefore the effectiveness of the project's poverty-focus targeting is not conclusive.

³⁶These figures are for both MCC and GOM financed parts; the beneficiaries for MCC-funded plantations and the associated number of beneficiaries are 60704 Ha and 39566 beneficiaries respectively.

³⁷ The relevant figures should be rural poverty and not total poverty, has rural poverty been used as a comparator, the results would be different.

Fig 1: Histogram average area planted per beneficiary

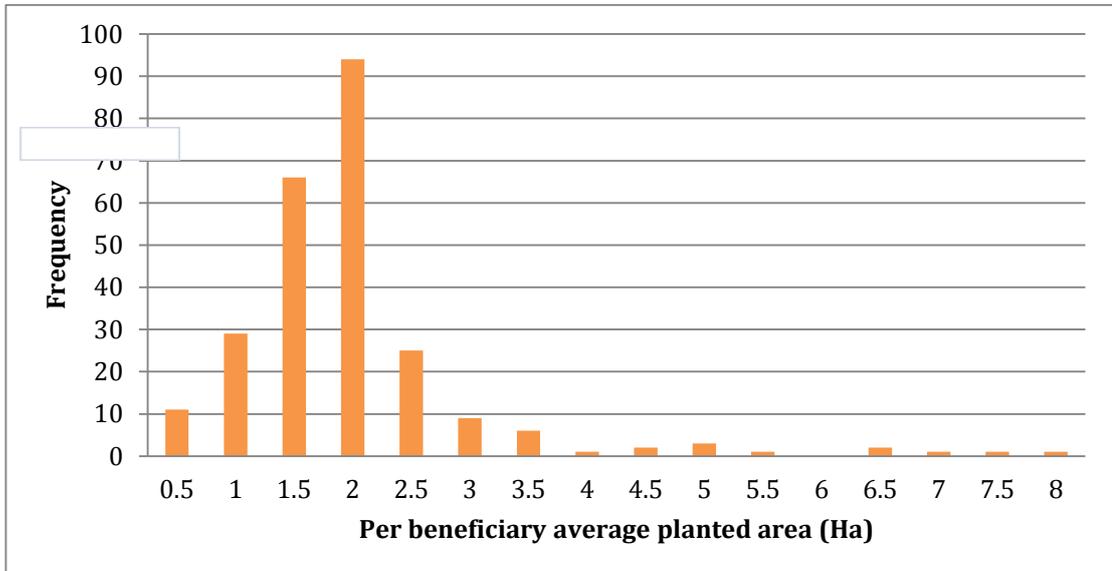


Figure 2: Cumulative frequency distribution - average area/ beneficiary

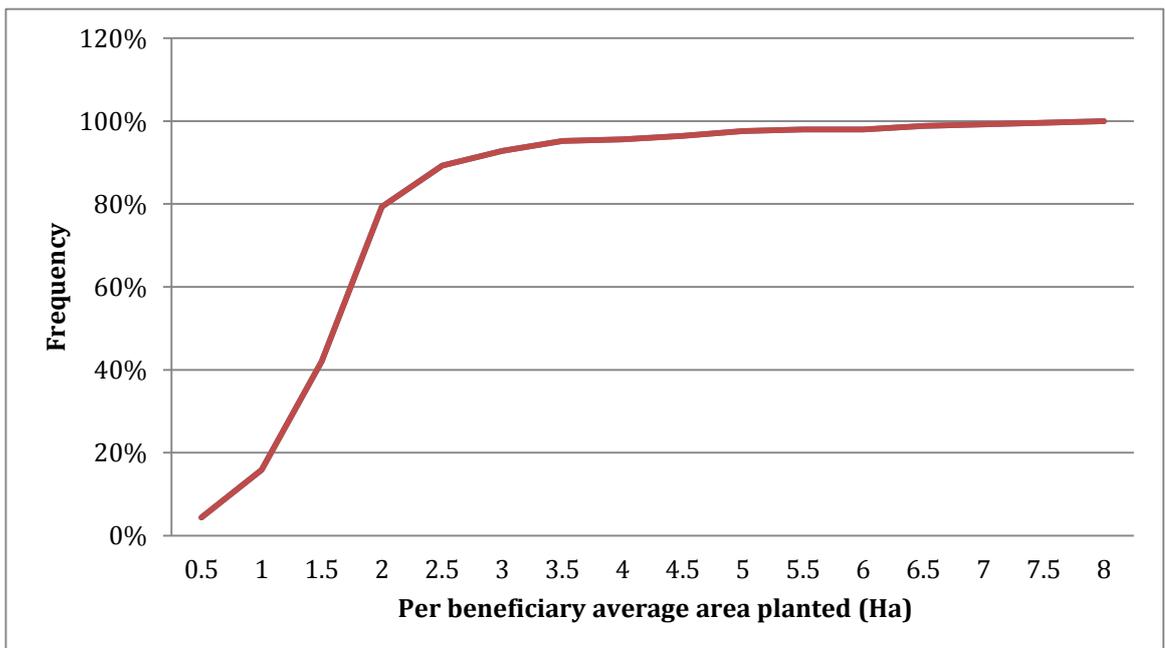


Table 4: Project beneficiaries by region and by poverty level

Province	Area planted (Ha)	%	Average area planted /beneficiary	Number of beneficiaries	%	Provincial poverty level	As % of National poverty level
Al Hoceima	1322	1.60	1.64	806	1	6.9	0.77
Al Haouz	3073	3.72	1.13	2722	5	14.9	1.66
Azilal	3651	4.42	1.37	2672	5	14.2	1.58
Berkane	299	0.36	0.50	597	1	8.7	0.97
Bni Mellal	1354	1.64	1.51	895	2	8.7	0.97
Khnifra	1884	2.28	2.08	906	2	11.7	1.30
My Yakoub	2684	3.25	1.01	2659	5	16.7	1.86
Larache	6785	8.21	1.49	4556	8	7.6	0.84
Ouazzane	7271	8.80	1.34	5409	10	13	1.44
Taounate	20098	24.32	1.50	13436	25	13.3	1.48
Taza	28393	34.36	1.86	15257	28	10.3	1.14
Tétouan	5427	6.57	1.49	3632	7	4.7	0.52
Sefrou	389	0.47	1.25	311	1	13.6	1.51
Total/Average	82630	100	1.53	53858	100	11.1	1.23

FINANCIAL ANALYSIS

117. **Objectives and Approach.** The objectives of this financial analysis are to: (i) assess the financial viability of the interventions proposed under Project for the smallholders and their households; and (ii) examine the impact of Project on household incomes and return to labor;

118. The approach used is to determine whether: (i) project interventions offer sufficient financial incentives to promote sustainable adoption by the benefiting households, and whether (ii) the incomes generated by such intervention are adequate for the participating smallholder. The indicative crop budgets were integrated in the cash flow presenting the situation of “with” and “without” project scenarios. The FIIR is then calculated by estimating the incremental benefit for the average planed area under the assumption that the initial investment outlays is treated as investment support by the project to the beneficiaries.

119. Four key variables that affect the profitability of the newly established olive plantations are: (i) the agricultural practices used, (ii), the level of the olive’s yield with each type of agricultural practices used (Improved vs. Traditional), (iii) the yield of field crops (cereals, legume and forage crops); and (iv) the relative prices of inputs and outputs prices of field crops and olive oil. For these variables, values have been used as default values these are (v) improvement in the percentage of extra olive oil produced and sold in addition to improvement in price. In order to facilitate comparison between different scenarios, a basic rate of return has been set as a benchmark against which the robustness of the project profitability is judged. This level of FRR is labeled, for convenience, the Basic Rate (BR) and the values for the variables that will be simulated are labeled Basic Variables (BV) (Table 6).

120. In **the sensitivity test** exercises, the basic values (BV) of the key variables will be changed, keeping the others fixed at their BV. (Table 6). The basic constant-price FRR was estimated at 22%.

Table 5: Assumptions for basic FRR

Basic variables	Value
Overall rate of intercropping	0.89
Average area planted per beneficiary (Ha)	1.56
Olive fruit oil content (%)	23
% Of Virgin oil produced	0.50
% Of Extra Virgin Oil produced	0.50
Price of Virgin oil (MAD/Litre)	29.3
Price of Extra Virgin oil (MAD/Litre)	36.2
Olive yield With IAP (MT/Ha)	2.15
Olive yield With TAP (MT/Ha)	1.57
Improved Agricultural Practices	0.55
Olive oil Variable costs of production factor	1

121. **Intercropping** is a critical variable in this project. Without it the profitability of this project is significantly compromised. Table 7 shows clearly that if the FRR is sensitive to intercropping.

Table 6 Intercropping vs. FRR

Intercropping	FRR
0%	11%
40%	15%
80%	21%
89%	22%

122. **Output prices** Any increase in the price of both types of olive oil will increase the rate of return in both IAP and TAP depending on the level of the yield. But again the TAP outperforms the IAP with wide margin. The same thing cannot be said about the change in the yield or price of cereals. Any increase in the price and or area cropped by will lower the FRR.

123. **Impact on Income and labour.** The project impact on participating household income is Negative during the first 5 years, and positive from Year 11 onward. However, the weight of income derived from field crops, is very important, it constitutes 162 % of the total income, in the first five years 50% in the second five years of the project and 26% only from year 11 onward. This confirms the importance of intercropping in the conditional profitability of the project. The average income per household at full development from the newly established plantations and from field crops is expected to be around MAD 22467 / year 76% from olive plantations and 26% from field crops. Return to labour is expected to be around MD 4028 of which 25 % will go to family labour. (Table 8)

Table 8 Project impact on household income and labor

Attribute	Y1- Y5		Y6 - Y10		Y11- Y20	
	WP	WOP	WP	WOP	WP	WOP
Income						
Olive products	(2,342)	-	5,462	-	17,127	-
Field crops	6,125	6,380	5,806	6,380	5,360	6,380
Return to labor	1,100	5,998	1,100	5,686	4,028	5,248
Total						
% Of field crops in total annual income	162. %	100 %	52 %	100 %	24 %	100 %

ECONOMIC ANALYSIS

124. **Objectives.** The physical inputs and productions established in the financial analysis provided the basis to determine the viability of the project investment in terms of opportunity costs and quantifiable benefits to the economy as a whole. Therefore, the objectives of the economic analysis are: (i) to examine the overall Project viability, and (ii) to assess the Project's impact and the benefits from a broad welfare perspective.

125. Four key variables that affect the economic viability of the newly established olive plantations are: (i) the agricultural practices used, (ii), the level of the olive's yield associated with each type of agricultural practices used (Improved vs. Traditional), (iii) the yield of field crops (cereals, legume and forage crops); and (iv) the relative prices of inputs and outputs prices of field crops and olive oil. (v) Improvement in the percentage of extra olive oil produced and sold in addition to improvement in price. For these variables, values have been used as default values these are

126. As has been done in the calculation of FRR, a basic ERR has been estimated and used as a benchmark against which the robustness of the project viability can be measured. This level of ERR is labelled, for convenience the Basic Rate. These basic values will be changed, keeping the others variables fixed at their basic values. The basic values are indicated in table 9 .The basic constant- price ERR was calculated at 12.2%.

Table 9: Default variables and their respective values for the Basic ERR

Default variables	Units	Default Value
Number of trees per Ha	Tree/Ha	102
Fruit content of olive oil	Litre/Kg	0.23
Yield of olives (IAP)	MT/Ha	2.15
Yield of olives (TAP)	MT/Ha	1.57
Farm gate Price ordinary virgin olive oil	MAD/Litre	29.3
Farm gate Price Extra virgin olive oil	MAD/Litre	36.2
Ordinary virgin oil produced and sold	%	0.5
Cost of olive trituration	MAD/Kg	0.56
Area intercropped with field crops		0.77
Default residual value	MAD	851924012.4
Adoption rate	%	55%
Wheat yield	MT/Ha	1.5
Vetch yield	MT/Ha	1.3
Bean's yield	MT/Ha	0.9
Average inflation rate (2008-2013)	%	0.023
SCF	Number	0.80

127. **Intercropping** is a determinant variable because of technical factors associated with cultivation of fruit trees in general and olive trees in particular. Olive trees under this project have been planted in a staggered way with the bulk of the plantations affected in 2011 -2013. The financial income stream shows clearly that income from olive plantations is negligible in the first 5 years and part of the second 5 years. Field crop income is fairly stable and important in value. Furthermore, in the “With project” situation the inter-cropping area with field crops has not decreased significantly during the first 10 years, and therefore the weight of the income stream generated by field crop cultivation during this critical period in the economic analysis affects the ERR in a very significant way. Therefore intercropping is a critical variable in this project, without it the viability of this project is significantly compromised (Table: 10)

Table 10: Intercropping vs. ERR

Intercropping Rate	ERR
0	5.5%
25%	7.4%
35%	8.2%
55%	9.9%
79%	12.2%

128. **Improved Agricultural Practices.** The operating cost of oil is considerably higher under IAP than under TAP. Even if the yield is high, intercropping remains a critical variable. This implies that adoption of IAP associated even with higher yields would not compensate for the income lost had intercropping been abandoned and/or reduction in the operating cost of olive production. This explains the farmers' reticence and risk averse attitude vis-à-vis the adoption of IAP.

129. **Output prices** Any increase in the price of both types of olive oil will increase the rate of return in both IAP and TAP depending on the level of the yield. But again the TAP outperforms the IAP.

130. **Operating variable cost** As the operating cost of olive production under IAP decreases, the ERR decrease at each level of intercropping. The ERR increases at each level of the cost decrease as intercropping area increases.

131. **Soil and Water Conservation works** were implemented in about 45% of the planted area, the approximate cost of which is about 10% of the land development cost. If the results regarding the status of these works were confirmed³⁸, the ERR as estimated here would have been achieved at a lower investment cost.

132. **Employment creation under the Project.** It is estimated that each hectare of land that was developed and planted used a minimum of 54 man-days /Ha in the first year and 36 man-days /Ha in the second year, generating the equivalent of 5.6 million man day-days of employment opportunities over a period of 5 years of project implementation. This excludes wages and salaries paid to unskilled and semi-skilled laborers in the supporting sectors such as machinery operators, transport service

³⁸ The majority have been destroyed in areas where intercropping is practiced.

providers, nurseries, as well as salaries paid to highly skilled personnel such as engineers, managers, foremen and supervisors. Total wages paid by the project for unskilled labor is estimated at about USD 50 million, all of which was injected in the rural area, giving a real push to the rural economy, creating a dynamic economic environment leading in turn to increased real demand for goods and services, and higher economic activities. A good portion of the remaining 50% of the funds disbursed by the project was spent on the procurement of capital goods, payment of interest and service charges on borrowings, salaries paid to contractors' top management and technical staff, and profit and taxes. Tree planting activities under the Project are labor intensive and hence expected to generate additional seasonal but permanent employment opportunities and casual labor along the value chain of fruit trees (i.e. pruning, treatment and harvesting, transportation services and transformation). It is estimated that at full development, an average of 4700 to 5000 permanent seasonal employment opportunities would be created annually.

Table 11: PROJECT ON PRODUCTION AND EMPLOYMENT

	Unit	Y1	Y2	Y3	Y4	Y5	Y6-Y10	Y11-Y20
a								
b Area planted by fruit trees	Ha	2,205	14,160	43,727	52,690	60,704	60,704	60,704
l Number of beneficiaries	HH	1,412	9,066	27,995	33,733	38,864	38,864	38,864
e Land development labour cost (MAD million)	MAD	9.68	60.73	182.48	177.97	80,29		
1 Number of work-days generated (million)	Million Man-day	0.15	0.95	2.9	2.78	1.5		
1 Number of permanent seasonal work-days created/Ha/year (IAP)	Man-day			24	10	10	21	37
1 Number of permanent seasonal work-days created/Ha/Year (TAP)	Man-day			6	8	6	9	17
P Weighted average of permanent work days generated/Ha/Year	Man-day			13	9	8	14	25
C Total Weighted average of permanent seasonal employment generated by the total area planted	Million Man-day			0.58	0.45	0.48	0.86	1.52
O Equivalent of full time annual employment positions created	Man-day			1,811	1,415	1,493	2,684	4,743

CONCLUSION AND LIMITATIONS

ECONOMIC AND FINANCIAL IMPACT

133. **Income.** The expected impact of the extension activity on the target group is likely to be positive both in terms of income, food security and poverty reduction. The income from newly established plantations will start to accumulate very slowly until it stabilizes at a fairly high level from year 10 onward. The income deficit during the first 5 years or so is compensated for by income from intercropping of field crops. From year 5 to year 10 income derived from olive plantations is likely to turn positive and the overall situation of the participating farmers will start to show a significant improvement. From year 10 through to year 20, it is expected that the farmers will start to feel the real benefit of the project in terms of significant increase in real income. At that point, the role of intercropping will still be important but significantly reduced as a percentage of the overall income of the households.

134. **Food security** In terms of the project's impact on food security, there is no doubt that without intercropping, food security of the participating farmers would have been seriously threatened. At full development, and thanks to newly established fruit trees, the food security of the participating households is likely to be enhanced further.

135. **Poverty** With respect to the impact on poverty, the available information is not sufficient to confirm that the project interventions have reached the real poor in the project area. However, 80% of the framers in the selected villages obtained 83% of the areas planted. The average are planted by each beneficiary is about 1.56Ha. The Provinces that have been targeted by the project have high poverty level.

136. **Employment** The project has directly generated over the 2009-2013 period the equivalent of 5.6 million man day-days of employment opportunities. Tree planting activities under the Project are labor intensive and hence expected to generate additional seasonal but permanent employment opportunities directly associated with the value chain of fruit trees. It is estimated that at full development, an average of 4700 to 5000 permanent seasonal employment opportunities would be created annually.

137. **Financial Analysis** Thanks to investment support and intercropping, the project is financially viable. The basic Financial Internal Rate of Return (FRR) at constant prices is estimated at 22 %. The FRR is sensitive to intercropping. Any decrease in the area dedicated to intercropping reduces the FRR. Higher adoption rate of Improved Agricultural Practices will cause the FRR to increase only at higher yield levels. Increase of field crops and/or their prices tend to lower the FRR. A decrease in the operating cost of olive oil production increase the FRR.

138. **Economic feasibility** The basic constant price Economic Rate of Return ERR was calculated, at 12.2%. The ERR responds in the same fashion as the FRR, to changes in the intercropping rate, IAP adoption, changes in operating cost of the outputs and changes in yields. Increases in field crop prices tend to lower the ERR. Adoption of IAP at lower yield is not attractive.

CHALLENGING QUESTIONS

ENVIRONMENTAL ISSUES

139. No attempt has been made to calculate the ERR with environmental costs and benefits incorporated in the analysis for a number of reasons; lack of accurate information regarding potential costs and benefits to the environment in the “With project” and the “Without project” situations; most of the soil and water conservation works that have been constructed in nearly 45% of the area planted, have not been welcomed by farmers and are likely to disappear overtime; and most importantly, intercropping which is considered as one of the main sources of soil erosion continued to be a key economic activity both in the “WT project” and “WOT project” situation. Without conclusive evidence that these works are fully operational, there is therefore no rationale to pursue the calculation of the adjusted ERR for environmental benefits.

SUCCESS RATE

140. The rate of return was calculated on the assumption of 100% plantation success rate. The reality, as witnessed during the fieldwork to 7 provinces and 14 perimeters undertaken by the mission³⁹, is different. The state of the plantations is not of poor quality, and the mortality rate of the trees is certainly not insignificant.

141. Proscribed grazing has been systematically identified in Focus Group discussions as an important problem, which was confirmed by direct field observations and discussions with CT supervisors and TA staff. This problem, which is responsible for considerable damage to the young olive trees, must be investigated, paying proper attention to all stakeholders, including the landless households who rely on livestock for their livelihood.

142. In order to put an end to the uncontrolled grazing, issue, a negotiated settlement involving the concerned parties must be sought. Possible solutions may include among other things, recognition of right of passage of animals, establishment of stock routes, recruitment of guards, and protection of the trees along the stock routes

143. The plantations’ hand-over procedures must be investigated to assess the quality of the land development works and to determine the exact tree mortality rate and identify the causes thereof. Dead and damaged trees should be replaced.

³⁹ The ongoing project completion and the impact assessment missions have reached similar conclusions.

AGRICULTURAL PRACTICES

144. Focus group discussions confirmed the Baseline Survey findings, which determined that most project participants' own well established and productive olive plantations. Farmers have inherited these plantations together with the husbandry techniques that came with it. Manure is used from time to time, the preparation of the tree basins done during the land tilling exercise for field crops, and mineral fertilizers are used for field crops part of which is indirectly fertilizes the trees as well. Harvesting is manual conducted using mostly family. While farmers are fully aware of the IAP, they stated that they are unlikely to use it for reasons associated with, inheritance, prices price and yield risk and the phenomenon *Alternate Bearing* and of olive plantation