Annex 6. Direct financial needs and benefits of the SLM technologies at farm level

Preface

The report presents the assessment of direct financial needs and benefits of SLM technologies that implemented in the selected demonstration sites in the rainfed and irrigated landscapes of the DS-SLM project areas in line with Outputs 4.5.1 and 4.5.3 of the Project Logframe and Workplan 2017.

The assessments is based on field data and the official statistics and agricultural data and reports of subnational and local organizations and SLM projects, and review of field survey and local interviews in the frame of PLUD meetings and other events. Full report on economic analysis and financial needs at farm level is presented in the progress report of NCs. Brief review is summarized below.

6.1. Direct Financial Needs and Benefits of the Implementation of SLM Technologies at Farm Level

Project Site s and Demonstrated SLM Technologies

As indicated above, DS-SLM project activities is concentrated in the selected foothill semi-desert landscapes, typical for the country and subject to DLDD:

1. Central foothill semi-desert province: irrigated agricultural lands in Zarbdor district of the Djizak region.

2. Southern foothill semi-desert province: rainfed and irrigated agriculture lands in Kamashi district in the southeast of Kashkadarya region.

The following SLM technologies were demonstrated on two project demo sites within project areas:

Irrigation lands (Zarbdar)	**Technology 1.**Crop diversification on salt-affected soils with introduction legumes and green manure (siderate).
	Technology 2. Adaptation of innovative drought- prone and salt - tolerant varieties of crops ("Gulistan" cotton variety as example)
Rainfed (Kamashi)	**Technology 3.**Increase in forage production by sowing of desert drought-resistant plants on rainfed lands
	Technology 4. Planting of almonds on small terraces for increase in efficiency of rainfed lands and prevention of erosion

Calculation of expenses and benefits is executed for two design alternatives:

Alternative 1 "Without Project":	Usual agrotechnical practices used by farmers without introduction of SLM technologies
Alternative 2 "With Project" :	Selected SLM best technologies are introduced in project farms

6.1.2. Economic analysis

Crop Budget

The crop budget is estimated for assessment of influence of project actions on the income of farmers and their ability to provide project actions in the future. The crop budget of selected technologies was carried on base following data (i) crop yield, (ii) costs of seed, fertilizer, herbicides, (iii) costs of labour, techniques, etc. Summary Crop Budget is given in Table 6.1.

Table 6.1. Financial Needs for the Implementation of SLM Technology

	Measures	Costs (per ha)	
		UZB thou.sum	USD$
Technology 1. Crop diversification on salt-affected soils with introduction legumes and siderats			
1	Inputs (seeds, fertilizers, pesticides)	1156	146
2	Agro measures (soil preparation, sowing, watering, cultivation, etc.)	466	58
	Total variable costs	**1622**	**203**
Technology 2. Adaptation of drought-prone and salt-tolerant varieties of crops ("Gulistan" cotton variety as example)			
1	Inputs (seeds, fertilizers, pesticides)	1330	166
2	Agro measures (soil preparation, sowing, watering, cultivation, etc.)	799	100
	Total variable costs	**2129**	**266**
Technology 3. Increase in forage production by sowing of desert drought-resistant plants on rainfed lands			
1	Inputs (seeds, fertilizers)	448	56
2	Agro measures (soil preparation, sowing, cultivation, etc.)	400	50
	Total variable costs	**848**	**106**
Technology 4. Planting of almonds on small terraces for increase in efficiency of rainfed lands and prevention of erosion			
1	Inputs (planting)	1301	163
2	Preparation of small terraces	1385	173
	Total variable costs	**1686**	**336**

Economic benefits

Realization of project actions will lead to increase in productivity of agricultural cultures, increase in income of farmers from sale of complementary crops (mung, almonds) and also to saving of forages costs. For assessment of the listed agricultural benefits economic gross profit per 1 hectare with use of the economic prices has been estimated. The economic budget of crops are summarized in Table 6.2.

On the irrigated lands by 20th year annual increase in net agricultural benefits by 2 168.749 million sums is supposed. In the situation of "without project" net agricultural benefits presumably are left invariable. On the rainfed lands the loss of 28.935 and 0.348 million sums respectively is expected in the first 2 years, and then annual increase in net agricultural benefits at 836.71 is supposed. In the situations "without project" net agricultural benefits presumably are left invariable.

Table 6.2. Financial Gross Revenue, thousand UZB Sum / hectare

Irrigated lands

№	Crops	Without project	With project				
			1-5 years	6 years	7 years	8 years	9 years
1	Cotton «Gulistan» (new variety)	-	1 785.77	1 896.50	2 007.22	2 117.95	2 228.68
2	Cotton	268.20	268.20	360.69	453.19	545.68	638.18
3	Wheat	876.47	876.47	893.56	910.64	927.73	944.81
4	Legumes +siderat	-	1 177.89	1 177.89	1 177.89	1 177.89	1 177.89

№	Crops	With project					
		10 years	11 years	12 years	13 years	14 years	15 years
1	Cotton («Gulistan» variety)	2339.41	2 362.62	2 385.83	2 409.03	2 432.24	2 455.45
2	Cotton	730.67	753.88	777.09	800.29	823.50	846.71
3	Wheat	961.90	961.90	961.90	961.90	961.90	961.90
4	Legumes +siderat	1177.89	1177.89	1177.89	1177.89	1177.89	1177.89

Rainfed lands

№	Crops	Without project	With project				
			1 years	2 years	3-4 years	5-13 years	14 years etc.
1	Wheat	610.17	610.17	610.17	610.17	610.17	610.17
2	Fodder crops	-	-808.00	-	-	-	-
3	Almond	-	-1686.48	-30.00	32644.32	32151.60	72130.00

Source: Assessment of the consultant

Profitability of the project actions

Results of the economic analysis are presented in the Table 6.3

Table 6.3. Profitability of the project actions

№	Scenario	EIRR	NPV	B:C relation
1	Basic scenario	16.1%	1 899.92	1.25:1

Based on comparison of alternative cost of the capital (12%) the rate of EIRR of the project equal to 16,1% proves its economic efficiency. The NPV value is more than zero and it is 1 899,92 million sums. Benefits exceed expenses on the project by 1,25 times.

Analysis of sensitivity of the basic option

For the analysis of sensitivity of basic option, the following scenarios:

(i) decrease in the expected project benefits by 5%; (ii) increase in the project expenses (capital and current) for 10%; (iii) increase in project expenses (capital and current) for 20%; (iv) lag in obtaining project benefits for 2 years. Comparison of all analyzed scenarios is presented in the Table 6.4

Table 6.4. Analysis of sensitivity of the basic option

Scenario	EIRR	NPV	B:C relation	Threshold limit value *
Basic option	16,1%	1 899.92	1.25:1	
Scenario 1	13,8%	881.81	1.12:1	-9,33%
Scenario 2	14,2%	1 088.01	1.13:1	+23,2%
Scenario 3	12,5%	265.92	1.03:1	
Scenario 4	11,7%	-144.60	0.98:1	1,8 year

Source: Consultant' assessment

** Threshold limit value - % of change of benefits or costs, at which EIRR =12%, i.e. it is threshold of economic viability*

The analysis has shown that the project is sensitive in relation to possible changes and the most sensitive in relation to change of dates of receipt of project benefits. EIRR of the project will be decreased by 2,3% at decrease in the expected project benefits by 5%. 10% decrease in benefits is critical for the project.

Simultaneous increase in project costs (capital and current) for 10 and 20% leads to decrease in EIRR value by 1,9% and 3,6% respectively. The project becomes economically impractical at increase in costs of 23,2%.

The project is most sensitive to lag in obtaining project benefits. In case of lag in obtaining project benefits for 2 years, EIRR decreases by 4,4% in comparison with basic option, and NPV becomes negative. Lag in 1,8 years is critical for the project.

Table 6.5. Main Benefits from the Selected SLM Technologies

№	SLM practices	Measures/Actions	Economic effects	Environmental effects
Irrigated lands (Zarbdar district)				
1	**Improvement of the existing crop rotations :**			
	Diversification of crops	1.Introduction of legumes crops (mung bean) after harvesting of winter wheat 2.Sowing of the green manure (winter rye) as green fertilizer	Increase yield and income of rural community Support of food security Saving of nitrogen fertilizers Saving of amount of the introduced fertilizers Increase in biological control over diseases Reducing the cost of pesticides and herbicides	Enrichment of the soil by nitrogen, humus, improvement of soil structure. Improvement of soil health and soil micro flora and soil organisms Decrease of soil salinization, salt accumulations in root zone, and unproductive evaporation Increasing vegetation cover and improvement of land use Increase of soil fertility. Reduce plant diseases
Introduction of drought-prone and salt- tolerant cotton variety				
2	New drought-prone and salt-tolerant variety of cotton	Introduction of drought- prone and salt-tolerant cotton variety «Gulistan»	Increase in income of the farmer at the expense of a gain of productivity and the better quality of fiber in comparison . Saving of cultivations costs and watering	Saving of irrigation water (2 irrigation events (approximately of 1600-2000 m^3/ha) Preventing soil compaction
Rainfed lands (Kamashi district)				
1	Agroforestry (almonds planting)	Almonds planting at small terraces.	Increase yield, and income of the farmer	Rain water harvesting (accumulation of atmospheric precipitation) Prevention of water and wind erosion. Increase of soil fertility Increase in biodiversity of rainfed agriculture lands and of forage production. Aesthetic improvement of the agro landscape Carbon sequestration in biomass and soils
2	Cultivation of drought-resistant fodder desert plants	Sowing of fodder desert plants in almonds row-spacing.	Providing livestock with fodder Reduced pressure on pastures and reducing the cost for restoring of the pastures	