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APPLIED WORK – first draft

Ex-Ante GHG Appraisal of the World Bank Environmental Services Project (ESP) in Albania (2014-2019)

DRAFT

Targeting Climate Change Mitigation in Agriculture with the EX-Ante Carbon Balance Tool (EX-ACT)

About EX-ACT: The *Ex Ante* Appraisal Carbon-balance Tool aims at providing *ex-ante* estimations of the impact of agriculture and forestry development projects on GHG emissions and carbon sequestration, indicating its effects on the carbon balance.

See EX-ACT website: ***www.fao.org/tc/exact***

Related resources

- EX-ANTE Carbon-Balance Tool (EX-ACT): (i) User Guidelines; (ii) Tool; (iii) Flyer
- See all EX-ACT resources in EASYPol under the Resource package, Investment Planning for Rural Development, EX-Ante Carbon-Balance Appraisal of Investment Projects

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Ex-Ante GHG Appraisal of the Environmental Services Project in Albania (2014-2019)

by

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for the

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, FAO

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Contents

1. Background

1.1 Study Framework: Ex-ante appraisal of the ESP project

This report is prepared to provide an ex-ante appraisal of the carbon balance of the Environmental Services Project (ESP). The carbon-balance is the estimated potential mitigation impact which could be generated in the coming 20 years by the implementation of the project. This appraisal also provides the impact of the project on other forms of natural capital, such as the incremental biomass generated and the incremental soil organic carbon, which directly affect the climate resilience of landscapes and watersheds. The report also develops options to use the mitigation performance for *Payments for Environmental Services*.

1.2 Natural resources in Albania

Albania has a total surface area of 2.9 million hectares (ha), 52 percent (1.5 million ha) of which is forest, 17 percent (0.48 million ha) of which is pasture, and 3 percent (87,000 ha) of which is cropland. The forest cover is classified as 30 percent high forest, 42 percent coppice and 28 percent shrub forest. Timber volume is concentrated in high forests (80 percent), followed by coppice forests (19 percent) and shrubs (0.2 percent). Only 2/3 of arable land is being cropped, while only about 1/4 to 1/3 of cropland is under irrigation.

In Albania, the villagers manage both agriculture and forestry, typically as part of diverse agro-forestry and silvo-pastoral systems. Within a watershed, villagers typically use the higher and steeper land for forestry (wood supply and erosion prevention) and pasture, and the lower land for agricultural crops. The Albanian forestry sector holds great potential to support national economic growth, rural employment, industrial development, and environment preservation.

1.3 Albania Climate change vulnerability - Environment issues

Albania is considered as one of the most vulnerable countries to climate change in East Europe and Central Asia due to high exposure to extreme weather events (droughts, heat spells, flooding), high sensitivity (great reliance on hydropower, irrigation and large share of population living in low elevation coastal zones) combined with low adaptive capacity (income inequality, GDP per capita and institutional capacity). Impacts on the agricultural sector are expected to be mixed with increased production in wheat and alfalfa and reduction in grapes, olives and livestock, though such regional specific forecasting of crop responses to future climate change are still associated with relevant levels of uncertainty.

Temperature increases of 1.7 to 2.3 degrees Celsius are expected by the mid-century, along with decreases in precipitation (-6.9 to -5.3 percent by 2050). In a regional context Albania is particularly sensitive to climate change with modified rain patterns and extreme weather events due to its high reliance on hydropower and large population in sensitive low lying areas (SIDA, 2011)[1].

Soil erosion is a major concern, mainly caused by unsustainable forestry, agricultural and pastoral practices. Particularly in the basins of Tomorrica, Zhullima and Petza the intensity of erosion is high. Reported forest lodging were stable but with greater lodging from privately managed forests. Since 2005 communal and participatory forest and pasture management plans have been introduced in 240 communes involving 744,434 ha or approximately 60% of

[1] http://sidaenvironmenthelpdesk.se/wordpress3/wp-content/uploads/2013/03/Albania-ECCPB-Alb-Nov-2011.pdf

total forest area. At national level there is a net uptake of carbon from Albanian forests (Drakenberg, 2011).

To many of the poor people in the Western Balkans, natural resources are important for their livelihoods. Land and water, for instance, constitute important assets for agriculture, which make up a large share of household incomes. Lack of access to natural resources may therefore be a key constraint to improved livelihood opportunities and increase vulnerability due to reduced access to important resource-based safety nets.

Watershed and land degradation are compromising the capacity of ecosystems to provide, maintain, and regulate critical functions and services, including resilience to climate variability and natural hazards (e.g. regulating floods and preventing droughts). Upstream land degradation reduces the capacity of ecosystems to retain water and regulate water flows, thus preventing excessive runoff during the rainy season. Downstream sedimentation and siltation reduces the water storage capacity of water bodies, thus reducing their **capacity to retain excessive water flows** during the rainy season (preventing flooding), and their capacity **to store water** for the dry season (allowing coping with possible droughts).

Forests are particularly exposed to abiotic and biotic hazards. Abiotic hazards include mostly fire and winds, snow, ice and frost. In Albania wild fire are of prime importance. The main cause is human negligence and old traditions of Mediterranean sheppards, putting fire to the ground for "grass regeneration". This can frequently wreak catastrophic damage. Heavy wild fires have repeatedly occurred during the last decades, challenging forestry, silvo-pastoralism, as well as the timber market. Only the more structural adoption of targeted forest management that respects the diverse interests of the different user groups as through operational silvicultural systems, is thereby seen as an effective means to prevent the negative impacts from wild fire and other damages.

1.4 Environment and climate change policies

Albania is playing an active part in international efforts to stop global warming and limit damaging climate change, which particularly threatens developing countries and the poor and vulnerable populations. E.g. the Albanian Prime Minister strongly supported the view that it was vital to reach an international agreement on a new commitment period under the Kyoto Protocol at the United Nations Framework Convention on Climate Change (UNFCCC) meetings in Copenhagen in December 2009.

The National Strategy for Development and Integration 2007–2013 (NSDI) recognizes that Albania has a relatively low impact on the global environment due to its low per capita GHG emissions[2], while likewise several measures for climate change mitigation and adaptation are already included in the strategy, mainly focusing on the two key areas:

- Forest protection (the management of forests and pastures, reforestation, combating illegal logging)
- Improvement of agriculture (management, technology, investment in irrigation and drainage infrastructure)

[2] *GHG emissions per capita in Albania were 2.47 t CO2 equivalent, which is 4 to 5 times lower than the average of industrialized countries. This is due to generally low energy consumption, with more than 90% of electricity being produced by hydropower plants and most energy being consumed as electricity.*

The primary responsibility for forest and pasture management belongs to the Ministry of Environment, Forests and Water Administration. The forest ownership rights have been delegated to communes (local level) according to case-by-case decrees of CM during 2008: Amendment to the Law No. 9385, dated 4.5.2005 on "Forests and Forest Service". A National Strategy on Forests Management (2001) and Biodiversity Strategy (1999) address the sustainable management of forests. Degradation has been identified as a major issue for the country, mainly due to uncontrolled grazing. Illegal cutting, mainly for energy needs in rural areas, is another phenomenon.

EU membership is one of the government's key objectives as manifested in the overarching National Strategy for Development and Integration 2007-2013 (NSDI). EU accession is thereby an important driver for improving environmental performances (SIDA, 2012)

Environment is both a specific policy area but also a cross cutting issue where success is directly linked to other policy areas such as agriculture, transportation and energy. The Environmental Sector and Cross Cutting Strategy adopted in 2007 outlines in this context in more detail that "*government priorities relate to adopting gradually EU standards, increasing investments especially in solid waste, air quality, sewage treatment, hotspot remediation, implementing and enforcing of environmental legislation, raising communication and awareness of environment and improving and strengthening the environmental monitoring systems*."

1.5 Environment Services Project (ESP): objectives and framework

From 2006 to 2012, the World Bank project *Natural Resources and Development Project* helped reduce upstream risks of erosion by improving the management of Albania's wetland, forest, and pasture resources, and creating water catchments. It was succeeded by the Improved Natural Resources Development Project (INRMP) and the Assisted Natural Regeneration Project to sequester carbon which is being purchased by the Bio Carbon Fund. Communal participatory forest and pasture management plans were prepared for 251 communes including 2,313 villages, covering 576,757 ha of forest and 203,436 ha of pasture. The *Environment Services Project* (ESP) has been prepared as a follow-up project to improve and promote the value of ecosystem services, in partnership with the Swedish Government and the GEF.

The development objective of the *Environmental Services Project* for Albania is to support sustainable land management practices with the aim of reducing human-induced land degradation, and increasing communities' income, in targeted project areas which are mainly in erosion prone rural areas. The Project supports a mechanism to attract and utilize a sustainable source of future financing through EU IPARD grants. In term of project area, the project should contribute to promote a *Continuous sustainable management of 955320 ha of forest and pasture* (PAD page 15).

2. Methodology and tools used

2.1 EX-ACT tool

The Ex-Ante Carbon-balance Tool (EX-ACT) is an appraisal system developed by FAO providing ex-ante estimates of the impact of agriculture and forestry development projects, programmes and policies on the carbon-balance. The carbon-balance is defined as the net balance from all GHGs expressed in CO_2 equivalents that were emitted or sequestered due to project implementation as compared to a business-as-usual scenario.

EX-ACT is a land-based accounting system, estimating C stock changes (i.e. emissions or sinks of CO_2) as well as GHG emissions per unit of land, expressed in equivalent tonnes of CO_2 per hectare and year. The tool helps project designers to estimate and prioritize project activities with high benefits in economic and climate change mitigation terms. The amount of GHG mitigation may also be used as part of economic analysis as well as for the application for funding additional project components.

EX-ACT has been developed using mostly the IPCC 2006 Guidelines for National Greenhouse Gas Inventories (IPCC, 2006) that furnishes EX-ACT with recognized default values for emission factors and carbon values, the so called Tier 1 level of precision. Besides, EX-ACT is based upon chapter 8 of the Fourth Assessment Report from working group III of the IPCC (Smith, et al., 2007) for specific mitigation options not covered in NGGI-IPCC-2006. Other required coefficients are from published reviews or international databases. For instance embodied GHG emissions for farm operations, transportation of inputs, and irrigation systems implementation come from Lal (Lal, 2004) and electricity emission factors are based on data from the International Energy Agency (IEA, 2013)

The EX-ACT appraisal process is interactive as well as participatory, and can strengthen the overall project design process, especially when a training and workshop element (for project teams, government counterparts, and other stakeholders) is integrated as part of the process. It may facilitate the discussion on ways to create incentives and institutional conditions that can promote their uptake (such as payments for environmental services).

2.2 Linking Appraisal with project monitoring

In projects as the ESP, the issue of barriers to adoption are important and it requires to scrutinize the way incentives are provided as well as how adoption rates are monitored. Adoption rates of improved techniques (% of areas with a specific improved technique) are most often monitored through household surveys and/or field visits. They should focus equally on monitoring positive practices (e.g. sustainable forest and land management practices) as well as from a mitigation perspective negative activities (e.g. residue burning). Essential practices thereby also include agro-forestry techniques, improved pasture management and the rehabilitation of degraded forestlands.

Since the main set of data used in GHG appraisals relates to the distribution of land uses and practices at project start the collection of adequate data concerning the starting situation is crucial for any monitoring scheme that wants to engage in comparisons to the situation throughout project implementation.

3. Direct and induced land use and management changes through project implementation

Firstly, the ESP Project encompasses direct field actions that are either i) environmental service payments targeted on the pilot watersheds which cover 37 communes (ii) IPARD-like grants targeted on the 82 new and updated communes with management plans. Secondly, using institutional capacity building and policy support, the project also has other induced impacts and promotes actions either on a voluntary-basis or through policies in the focus area and to a certain extend also beyond. The carbon appraisal is based on a project area of 955320 ha as referred in economic analysis (PAD page 15).

3.1 Land use change implications from direct field actions

Direct actions are planned in the 37 focused communes implying reforestation, promotion of agroforestry on formerly degraded lands, and restoration of degraded pasture. As part of the project design phase the following conservative estimates of concerned surfaces were made:

- 37 communes x 20 ha of agro-forestry = 740 ha of agro forestry areas
- 37 communes x 50 ha of afforestation = 1850 ha of afforested areas
- 20 communes x 90 ha of improved pasture = 1800 ha of degraded pasture transformed in improved pasture

Furthermore direct actions funded by IPARD that translate mostly into a transformation from degraded agricultural lands to agroforestry with the plantation of perennial tree crops (nuts, fruit trees, ...) with aggregated areas of 3000 ha (20 ha per micro project x 150 micro-projects) are also considered as direct project impact.

3.2 Impact on forest and pasture management

Based on official data provided by the Ministry of Environment, the current average of above ground forest biomass based on the 2014 forest inventory is of 73.2 m3/ha (24.1 Tons of Carbon) for most of the Albanian forest. Within the framework of the EX-ACT tool it thus can be represented by a subtropical mountain forest (65.8 Tons of carbon) with a larger extend of degradation of 63%. This will be used as a reference for the current state of Albanian forest in the analysis. Pasture areas are considered as currently severely degraded (around 60% of degradation).

These land areas are affected by the project through (i) extension and communication of Agriculture and Rural development Agencies (ARDA) and District Forest Offices, (ii) policy incentives and (iii) institutional support and capacity building at the level of communes. Since ex-ante appraisals are associated to relevant uncertainties concerning the adoption and further dissemination rates of foreseen measures, it is considered a good practice to compare different optimistic and pessimistic scenarios that help to identify which actions are the most crucial and to which extent project impacts would be decreased by low adoption rates. For this purpose we describe and compare in the following two scenarios:

a) *Optimistic scenario*

The 37 first-target communes will promote the implementation of Forestry Communal Micro Catchment Plans (FCMCP) on 177 879 ha. Based on expert assessment, these areas will be considered as including 60% for partly degraded forest areas (106727 ha), 30% of partly degraded pastures (53964 ha) and 10% of other lands. Such actions will improve fire management (burned forest area reduced from 13% to 10%) and it will contribute to a slight reduction of forest degradation (from 63% to 58%) and of pasture degradation (from 60% to 50%).

Additionally on the other Albanian communes, the project should contribute to promote a Continuous sustainable management on 777441 ha . Such area is constituted by 60% of forest land (466465 ha) 30% of degraded pasture (233232 ha) and 10% of other land. This will improve fire management (forest burned areas reduced from 13% to 11%) and it will very marginally reduce forest degradation (from 63% to 62%). Impact on pasture will be restrained to a reduction of fire periodicity from a yearly interval to every two years.

b) Pessimistic scenario

In the pessimistic scenario, the forest and pasture areas that are positively impacted through indirect support measures (commune planning, capacity building, extension) are only half of those considered above (around 388 720 ha instead of 777 441 ha). This illustrates a less successful household sensibilization (voluntary adoption) as well as gaps in the implementation of land use policies (incentive driven adoption). Furthermore it is assumed that the rehabilitation of grassland leads only to an increase in soil carbon that is half as strong as assumed under the optimistic scenario (leading to carbon stocks increasing from 61.4 T to 70.4 t of carbon per hectare instead of an increase to 83.6 t C/ ha). The other impacts are considered to equally take place.

3.3 Inputs – investments

While not being in the centre of a GHG impact analysis, project implementation is nevertheless related to consumption in energy resources that may be accounted for as part of an impact analysis. The main incremental consumption induced by the project is gasoil consumption due to both the increase in number of vehicles (from 20 to 30) and increases in field mobility of support services (petrol consumption increases from 200 litres to 300 litres of gasoil per week). As will be seen in the later analysis, this expectedly has a negligible impact on the overall GHG impact.

4. EX-Ante Appraisal results

4.1 ESP project Carbon Balance Appraisal – Optimistic scenario

As described in detail further above the optimistic scenario impacts over 1 million ha, mostly related to forest and pasture and reaches most Albanian communes. The table below summarizes the land use change impacts arising under the project and business as usual scenario. It becomes very obvious that the PES does not include especially significant scales of land use change, but targets more e.g. the change in degradation of maintained land uses.

Land Use Change Matrix

Surfaces evolutions by land use / category (hectares - ha)				
		State at the beginning	Without Project	With Project
Forest/Plantation		573,192	573,192	575,042
	Annual	3,000	3,000	0
Cropland	Perennial	0	0	3,740
	Rice	0	0	0
Grassland		288,996	288,996	288,996
Other Land	Degraded	2,590	2,590	0
	Other	0	0	0
Organic soils		0	0	0
Total area =		867,778	867,778	867,778

The table below instead provides the main results of the more favourable scenario: Over the full duration of analysis of 20 years, the project will generate marginal benefits of 11.4 million tonnes of CO2-equivalents, the so called carbon balance. This is equal to an impact of

13 t CO2-e per hectare or 0.7 CO2-e per hectare and year. Reflecting the relatively conservative assumptions concerning the intensity of reversing pasture and forest degradation, the ESP has thus mainly important impacts due to its relevant scale, while having a comparably medium mitigation intensity on a per hectare basis.

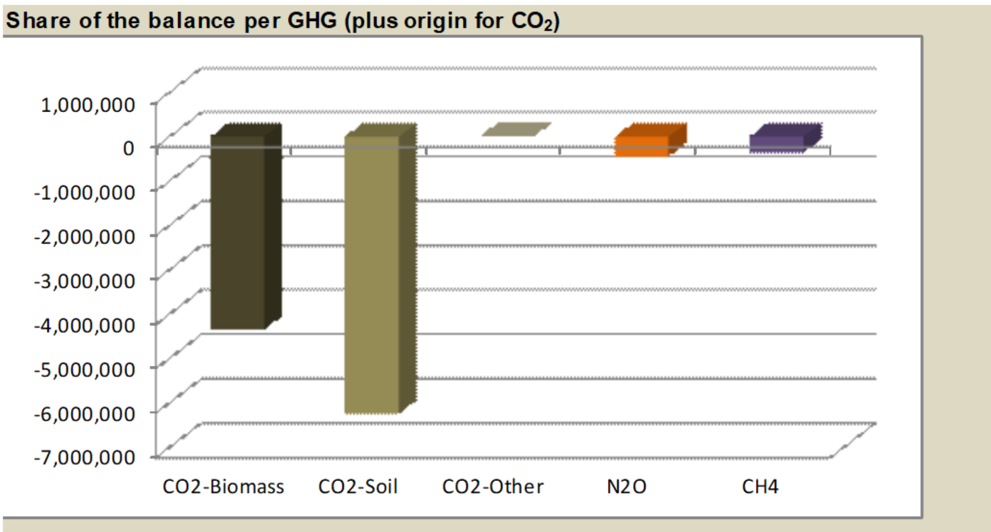
Carbon balance of the Environmental Service Project under an optimistic adoption scenario

Name of the project	ESP ALBANIA	Climate	Warm Temperate (Moist)	Duration (yr)	20
Continent	Eastern Europe	Soil	HAC Soils	Total area (ha)	867778

Component of the project	Gross fluxes Without	With	Balance	Share per GHG of the Balance Result per GHG CO_2 Biomass	Soil	Other	N_2O	CH_4	Results per year without	with	Balance
	All GHG in tCO_2eq Positive = source / negative = sink										
Land Use Changes											
Deforestation	0	0	0	0	0		0	0	0	0	0
Afforestation	0	-532,734	-532,734	-182,782	-349,952		0	0	0	-26,637	-26,637
Other	0	-373,636	-373,636	28,915	-402,551		0	0	0	-18,682	-18,682
Agriculture											
Annual	0	0	0	0	0		0	0	0	0	0
Perennial	0	-535,381	-535,381	-489,566	-45,815		0	0	0	-26,769	-26,769
Rice	0	0	0	0	0		0	0	0	0	0
Grassland & Livestocks											
Grassland	1,362,666	-3,355,457	-4,718,122	0	-4,032,546		-393,572	-292,005	68,133	-167,773	-235,906
Livestock	0	0	0				0	0	0	0	0
Degradation	1,199,062	-4,039,490	-5,238,553	-3,706,130	-1,411,810		-54,219	-66,394	59,953	-201,975	-261,928
Inputs & Investments	4,739	13,032	8,293			8,293	0		237	652	415
Total	2,566,467	-8,823,665	**-11,390,132**	-4,349,563	-6,242,674	8,293	-447,790	-358,399	128,323	-441,183	-569,507
Per hectare	3	-10	-13	-5.0	-7.2	-0.5	-0.4	0.0			
Per hectare per year	0.1	-0.5	-0.7	-0.3	-0.4	0.0	0.0	0.0	0.1	-0.5	-0.7

Having a more detailed look at the sub-components, it can be identified that the strongest single impacts stems from improved forest management (5.8 million t CO2-e) and improved pasture management (4.8 million t CO2-e). Differentiating not regarding practices, but concerning the concerned carbon pools, the project mostly enriches carbon levels in soil (6.4 million t CO2-e) and in biomass (4.7 million t CO2-e):

GHG impacts by Carbon Pool and GHG



Another relevant differentiation concerns those impacts achieved in the communes first targeted under the project and those impacts achieved in areas with updated communes: The directly targeted communes (177878 ha) are thus estimated to be responsible for around -8.3 million t CO2-e (71 %), while the other updated communes (777441 ha) account for -3.1 million t CO2-e (29 %).

While the above values provide the expected technical mitigation impact, it is at the same time important to associate also a rough monetary value with the in that way generated benefits. Based on a Social Cost of Carbon of 21 US$ per ton (US Interagency working Group[3]) and discounted at 10% over the 20 years of the carbon balance appraisal, the net present value of the GHGs mitigation is estimated around US$ 100 million.

While with the current uncertainties of future climate change impacts it is strongly uncertain how much costs each tonne of today emitted CO2-e will induce to society, it is nevertheless necessary to assume a reference price for current policy making purposes, that helps to provide a rough orientation of the value of mitigation measures. Using here the Social Cost of Carbon by the US Interagency Working Group allows illustrating the relevant and significant impacts generated in terms of climate change mitigation by the ESP beyond a pure non-monetary estimation of the mitigation potential.

4.2 ESP project carbon balance appraisal – Pessimistic scenario

Assuming instead a more pessimistic scenario, in which the ESP achieves only half of the impacts on forest and pasture management, the overall mitigation benefits are reduced roughly by half and the carbon balance accounts only for 5.8 million t CO2-e. This illustrates again that it are indeed the scale impacts that strongly matter for the carbon balance of the ESP project, since the amelioration impacts on a per hectare basis were in a conservative manner assumed to be moderate.

[3] *Interagency Working Group on Social Cost of Carbon. (2010). Social Cost of Carbon for Regulatory Impact Analysis. Interagency Working Group on Social Cost of Carbon. New York: United States Government.*

Carbon balance of the Environmental Service Project under a pessimistic adoption scenario

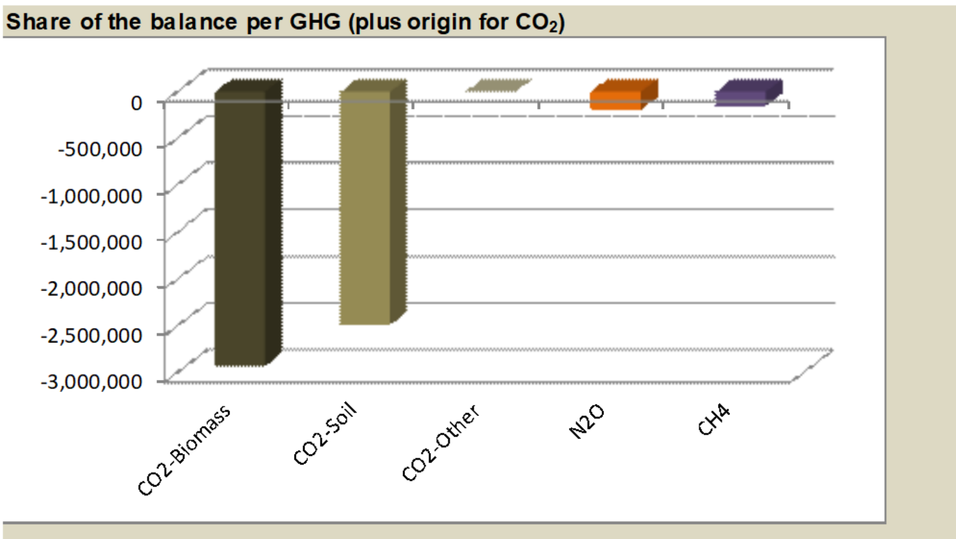
Name of the project	ESP Albania	**Climate**	Warm Temperate (Moist)	**Duration (yr)**	20
Continent	Eastern Europe	**Soil**	HAC Soils	**Total area (ha)**	437584

Component of the project	Gross fluxes Without	With	Balance	Share per GHG of the Balance Result per GHG CO_2 Biomass	Soil	Other	N_2O	CH_4	Results per year without	with	Balance
	All GHG in tCO_2eq										
	Positive = source / negative = sink										
Land Use Changes											
Deforestation	0	0	0	0	0		0	0	0	0	0
Afforestation	0	-532,734	-532,734	-182,782	-349,952		0	0	0	-26,637	-26,637
Other	0	-373,636	-373,636	28,915	-402,551		0	0	0	-18,682	-18,682
Agriculture											
Annual	0	0	0	0	0		0	0	0	0	0
Perennial	0	-535,381	-535,381	-489,566	-45,815		0	0	0	-26,769	-26,769
Rice	0	0	0	0	0		0	0	0	0	0
Grassland & Livestocks											
Grassland	685,577	-583,239	-1,268,815	0	-985,396		-162,704	-120,716	34,279	-29,162	-63,441
Livestock	0	0	0				0	0	0	0	0
Degradation	648,849	-2,409,509	-3,058,358	-2,289,891	-705,905		-28,123	-34,439	32,442	-120,475	-152,918
Inputs & Investments	0	0	0			0	0		0	0	0
Total	1,334,426	-4,434,499	**-5,768,925**	-2,933,324	-2,489,619	0	-190,827	-155,155	66,721	-221,725	-288,446
Per hectare	3	-10	-13	-6.7	-5.7	-0.4	-0.4	0.0			
Per hectare per year	0.2	-0.5	-0.7	-0.3	-0.3	0.0	0.0	0.0	0.2	-0.5	-0.7

In more detail the graph above shows that especially the impact of grassland rehabilitation is measures (1.3 mio t CO2-e instead of 4.7 t CO2-e) is significantly smaller in this such a less upscaled scenario. Likewise the impacts achieved through forest rehabilitation are relevantly smaller (3.1 mio t CO2-e instead of 5.3 mio t CO2-e). Results on a per hectare basis are instead rather unchanged.

Analysing impacts by carbon pool shows that this scenario that concerns less scale, has slightly stronger benefits from building up new biomass, as opposed to the more optimistic scenario where main impacts were achieved through soil carbon sequestration.

GHG impacts by Carbon Pool and GHG



4.3 Incremental Natural Capital generated

As a project that rehabilitates degraded forest and grassland areas and engages in afforestation of degraded mountainous areas, the ESP reconstitutes the watershed capacity, regulates water stream flow and contributes to biodiversity. It thus produces a set of benefits that are clearly distinct from their climate change mitigation achievements and are closely related to the incremental existence of additional biomass and reactivation of the ecosystem. While most of the benefits are of public nature, environmental resources and non-degraded natural capital may also provide an important source for income and food security.

The Carbon Balance Appraisal is based to large extents on foreseen increases in biomass values and thus also allows to provide an estimated impact of changes in selected stocks of natural capital:

Incremental Natural Capital Generated through Project Implementation

INCREMENTAL CAPITAL GENERATED BY THE PROJECT			
Project:	ESP Albania	1 United States Dollar = 101 (April 2014)	
	pessimistic scenario	**Units**	**Quantity** (units)
Area	437584		
Duration:	20		
	Natural Capital		
Direct private value			
A01	Incremental accumulated SOC on cultivated land (soil fertility)	t C	12,495
A02	Incremental stocks of non-timber biomass	t dm	1,142,853
	Fuelwood and -material	t dm	81,632
	Fodder	t dm	163,265
	Anti-erosive watershed coverage	t dm	897,956
	Compost	t dm	-
Indirect private value			
A04	Incremental area with erosion protection	ha	5,590
A05	Incremental area with increased drought resilience	ha	3,740
Public value			
A09	Incremental timber stocks in forestry and agro-forestry	t dm	144,057
A10	GHG balance (reduced emissions and C sequestration)	t CO2-e	5,768,925
A11	Incremental protected natural areas (forestry, peatland, wetland)	ha	
A12	Incremental new forest plantation (existance value)	ha	
	Total natural capital		

The table above (here for the pessimistic scenario) illustrates that the project leads to an estimated increases in timber of roughly around 144,057 t of dry matter due to the project, compared to 1.14 mio t of non-timber biomass over the full period of analysis of 20 years. Thereby the differentiation into further sub-components is based on assumptions.

Rehabilitation processes thus lead to important increases in biomass stocks with their multiple benefits. Again engaging in strictly conservative assumptions 5590 additional hectare should in such a way be effectively protected against erosion and 3740 ha against drought.

When using instruments of environmental valuation, as e.g. willingness to pay, selected indicators can also be translated into monetary values: Valuing timber at 87.72 USD per cubic meter and thus utilizing the average between the higher European and lower US-American timber price, the over 20 years created incremental timber stocks have a commercial value of 12.6 mio USD. As another example the surveys of farmers willingness to pay for drought resilience and soil and water conservation measures established values of around 2 USD per ha annually that farmers report to be willing to pay. If valued in such a way, the limited area with effective drought resilience (3740 ha) would generate over 20 years benefits of USD 43,758.

While these two examples are rather intended as illustration, project monitoring measures could investigate with more precision the generated benefits.

5. Linking the carbon balance with PES implementation mechanisms

Payment for ecosystem services has emerged as a substitute or supplement to spatial planning and regulatory schemes in the governance of watersheds (Engel & al, 2008). Society generally attaches a high value to the positive externalities of watershed landscapes and will take action to guarantee that they are provided for and conserved. This is the primary justification for the public funding of watershed management programmes. Command and control approaches to protecting the flow of benefits from watershed landscapes have often failed, so efforts have recently been made to create markets for these externalities (c.f. FAO, 2006[4]). Under such payment schemes for environmental services (PES), the beneficiaries of externalities or services pay the providers. This transforms an externality into a tangible income for service providers. When the provided service is a public good, payments schemes may be designed by public organizations.

In Albania, experience on Payment of Environment Services has been initiated through different pathways which are either in implementation process or in unachieved preparatory process generating however high expectation from stakeholders. We would distinguish:

- **Ulza watershed area**: where PES could support watershed protection carbon sequestration. Erosion control and obtaining a good water management are one of the main issues in the watershed. Potential buyers of ES are the Ulza Hydro-Power Plant (UHPP), other companies using large quantities of water, Local Government Unit (LGU), drinking water enterprises and downstream villagers, especially farmers using water for irrigation. Stakeholders downstream and upstream agreed that a specific PES scheme for the Ulza watershed could support maintaining and restoring ES of the watershed. There are advanced negotiations ongoing with Hydro-Power Plant (UHPP) and communes which are developing reforestation actions with Forest and Pasture Users' Associations (FPUA)
- **Bovilla reservoir** which provides 80% of Tirana water for the Tirana metropolitan area and where soil erosion and watershed management practices contribute to reduction of water volume and water quality
- **BioCarbon Fund experience**: The Assisted Natural Regeneration of Degraded Lands in Albania project is restoring 6,300 hectares of degraded lands by assisting with the natural regeneration of vegetation. The areas to be included in the project are all communal forest lands and involve a total of 24 communes and over 100 villages. It started in 2004 to sequester carbon and it purchased by BioCarbon fund through an

[4] FAO (2006). The New Generation of Watershed Management Programmes and Projects. Rome: FAO.

Emission Reduction Purchase Agreement (ERPA). However final payment to beneficiaries is still unachieved, the MOE being proceeding on first direct payment to joined bank accounts of communes and associations (24 associations and around 480 beneficiaries)

These experiences are just a prelude of other cases of possible payment of environment services which link with actions initiated by Forest and Pasture Users' Associations (FPUA) and they generate implementation challenges on the way to manage monitoring reporting and verification, to backstop and to deliver funding, to mobilize additional carbon funding. Furthermore new fundings as IPARD competitive grant scheme will contribute to upscale implementation of Communal Forest and Pasture Management Plans (CFPMP) using part of grants as PES for reforestation, land rehabilitation fencing , enrichment planting. Within this perspective EX-ACT based Carbon balance appraisal and monitoring could allow (i) to validate environment impact and Climate mitigation impact, (ii) to measure aggregate watershed impact (biomass, SOC), (iii) to aggregate at national level the whole impact of different Sustainable land and forest management projects, (iv) to mobilize additional climate fundings, (v) to generate additional periodic carbon payment after project completion.

Based on the present Ex-Ante appraisal, focusing on direct field targeted actions (3.1), which are the most conducive to benefit from Payment of Environment Services, a tentative estimation of PES per ha per year is provided below

	Hectares improved	Equ CO_2	Value[5] US$/ year	Value / ha/year	Institutional + MRVcost (40%)	PES/ ha /year (60%)
37 communes x 20 ha	740 ha of agro forestry areas	142,936	71,468	97	39	58
37 communes x 50	1850 ha of afforested areas	532,734	266,367	144	58	86
20 communes x 90 ha	1800 ha transformed in improved pasture	223,608	111,804	62	25	37
IPARD	3000 ha agroforestry	230,670	115,335	38	15	23
Total	7390 ha		564,974		225,990	338,984

This PES modelling simulates an accounting mechanism to switch from carbon balance to gross value per ha per year and to an estimated Payment of Environment Service per ha per year after subtracting part of the value for inputs, institutional support (communes fees?), and MRV cost. It provides PES / ha ranging between 23 and 86 US$ per year. It would represent an income distribution of 339000 US$/ year (inclusive of IPARD)

The services provided under the Environmental Service Project qualify in this sense for providing public goods in the form of watershed management, climate change mitigation, biodiversity conservation and provide also additional private benefits (soil fertility conservation, pasture conservation) for farmers and herders, that are income vulnerable groups in Albania.

Thereby some of the investments in forest and pasture rehabilitation are not fully self-enforcing and require additional incentives. They are thus threatened to be weakened or even

[5] Based on an assumption of 10 USD of value per ton of CO_2 (market value 2-3 US$, social cost 21 US$)

reversed after project completion and PES may be an important mechanism to ensure their sustainability. Forest density and degradation as well as pasture degradation can be monitored by various mechanisms, including household survey data, field visits, field measurements, remote sensing and GIS. Such monitoring data is essential in order to communicate clear conditions and constraints for PES schemes and their non-existence in a specific county context constitutes an important constraint to the elaboration of PES schemes. In this context the ESP has the option to remove this barrier, establish a working monitoring system under the project and possibly pilot an PES scheme for targeted measures of forest and pasture rehabilitation under its premises.

Annex 1: Data used in EX-ACT modules (optimistic scenario)

- Land Use change Module

2.2. Afforestation and Reforestation

Available AEZ — **1.Subtropical humid forest - 2.Subtropical dry forest - 3.Subtropical steppe - 4.Subtropical mountains systems**

Type of vegetation that will be planted	Fire Use (y/n)	Previous land use	Area that will be afforested/reforested: Without	*	With	*	Total Emissions (tCO2-Eq): Without	With	Balance
Forest Zone 4	NO	Degraded Land	0	D	1850	D	0	-532,734	-532,734
Select the vegetation	NO	Select previous use	0	D	0	D	0	0	0
Select the vegetation	NO	Select previous use	0	D	0	D	0	0	0
Select the vegetation	NO	Select previous use	0	D	0	D	0	0	0
Select the vegetation	NO	Select previous use	0	D	0	D	0	0	0
Select the vegetation	NO	Select previous use	0	D	0	D	0	0	0

* Note concerning dynamics of change : **D correspond to "Default"**, "I" to Immediate and "E" to Exponential (Please refer to the Guidelines)

Tier 2

Total Af/Re-forestation	0	-532,734	-532,734

2.3. Other Land use changes

Fill with you description	Initial land use	Final land use	Message	Fire use (y/n)	Area transformed: Without	*	With	*	Total Emissions (tCO2-Eq): Without	With	Balance
in 37 comm	Degraded Land	Perennial/Tree Crop		NO		D	740	D	0	-142,966	-142,966
300 comm. IPARD 3000ha	Annual Crop	Perennial/Tree Crop		NO		D	3000	D	0	-230,670	-230,670

- **Grassland module**

4.1.2. Grassland systems remaining grassland systems *(total area must remains contant)*

Description	Initial state	Final state of the grassland: Without project	With project	Fire use to manage: Periodicity without (y/n)	(year)	Periodicity with (y/n)	(year)	Area (ha): Start	Without	*	With	*	Total Er (tCC: Without
	Severely Degraded	Severely Degraded	Moderately Degraded	YES	*1*	YES	*2*	53,964	53,964	D	53,964	D	254,448
	Severely Degraded	Severely Degraded	Severely Degraded	YES	*1*	YES	*2*	233,232	233,232	D	233,232	D	1,099,730
	Severely Degraded	Severely Degraded	Improved without inputs managem	YES	*1*	NO	*5*	1,800	1,800	D	1,800	D	8,487

- **Forest management module**

5.1. Forest degradation and management

Available AEZ — **1.Subtropical humid forest - 2.Subtropical dry forest - 3.Subtropical steppe - 4.Subtropical mountains systems**

Type of vegetation that will be degraded	Degradation level of the vegetation: Initial state	At the end without project	with project	Fire occurrence and severity: Without (y/n)	Periodicity (year)	Impact (% burnt)	With (y/n)	Periodicity (year)	Impact (% burnt)	Area (ha): Start (ha)	Without (ha)	*	With (ha)
Forest Zone 4	Large	Large	Low	YES	3	13%	YES	3	10%	106,727	106,727	D	106,727
Forest Zone 4	Large	Large	Moderate	YES	3	13%	YES	3	11%	466465	466,465	D	466,465
Select the vegetation	Select level	Select level	Select level	NO			NO			0	0	D	0
Select the vegetation	Select level	Select level	Select level	NO			NO			0	0	D	0
Select the vegetation	Select level	Select level	Select level	NO			NO			0	0	D	0
Select the vegetation	Select level	Select level	Select level	NO			NO			0	0	D	0

* Note concerning dynamics of change : **D correspond to "Default"**, "I" to Immediate and "E" to Exponential (Please refer to t

- **Input and energy module**

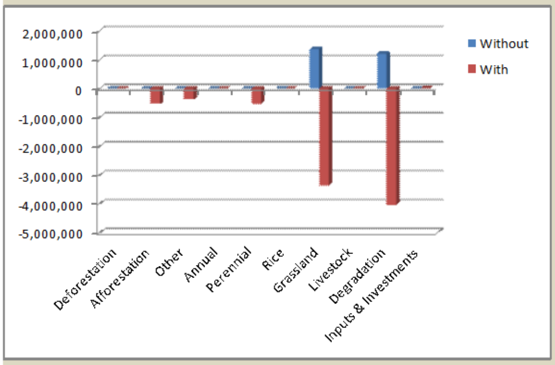
6.2 Energy consumption (electricity, fuel,…)

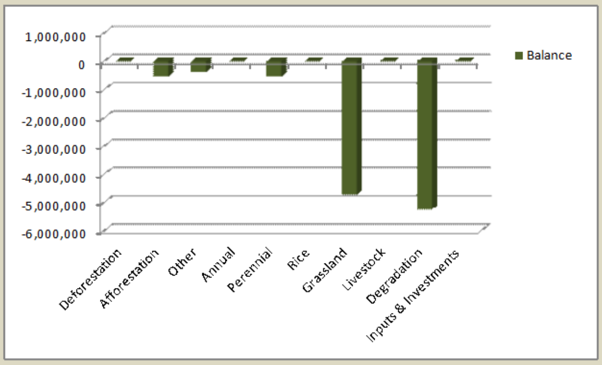
Description and unit to report	Quantity consumed per year: Start	Without	*	With	*		Total Emissions (tCO2-eq): Without	With	Balance
Electricity (MWh per year)									
Please select the country of origin	0	0	D	0	D		0	0	0
Liquide or gaseous (in m^3 per year)									
Gasoil/Diesel	90	90	D	270	D	20 veh 100l moving to 30 veh 200l	4,739	13,032	8,293

Annex 2a : Framework of results: Optimistic scenario

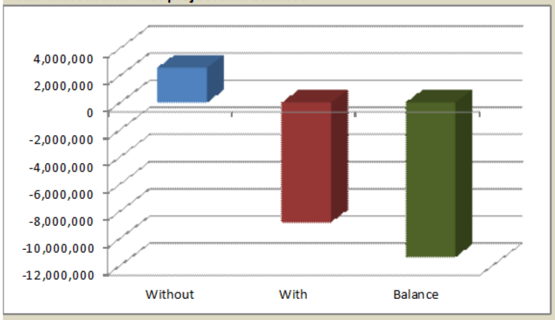
Name of the project	ESP ALBANIA	Climate	Warm Temperate (Moist)	Duration (yr)	20
Continent	Eastern Europe	Soil	HAC Soils	Total area (ha)	867778

Component of the project	Gross fluxes: Without	With	Balance	Share per GHG of the Balance – Result per GHG – CO_2: Biomass	Soil	Other	N_2O	CH_4	Results per year: without	with	Balance
	All GHG in tCO_2eq – Positive = source / negative = sink										
Land Use Changes											
Deforestation	0	0	0	0	0		0	0	0	0	0
Afforestation	0	-532,734	-532,734	-182,782	-349,952		0	0	0	-26,637	-26,637
Other	0	-373,636	-373,636	28,915	-402,551		0	0	0	-18,682	-18,682
Agriculture											
Annual	0	0	0	0	0		0	0	0	0	0
Perennial	0	-535,381	-535,381	-489,566	-45,815		0	0	0	-26,769	-26,769
Rice	0	0	0	0	0		0	0	0	0	0
Grassland & Livestocks											
Grassland	1,362,666	-3,355,457	-4,718,122	0	-4,032,546		-393,572	-292,005	68,133	-167,773	-235,906
Livestock	0	0	0				0	0	0	0	0
Degradation	1,199,062	-4,039,490	-5,238,553	-3,706,130	-1,411,810		-54,219	-66,394	59,953	-201,975	-261,928
Inputs & Investments	4,739	13,032	8,293			8,293	0		237	652	415
Total	2,566,467	-8,823,665	**-11,390,132**	-4,349,563	-6,242,674	8,293	-447,790	-358,399	128,323	-441,183	-569,507
Per hectare	3	-10	-13	-5.0	-7.2	-0.5	-0.4	0.0			
Per hectare per year	0.1	-0.5	-0.7	-0.3	-0.4	0.0	0.0	0.0	0.1	-0.5	-0.7

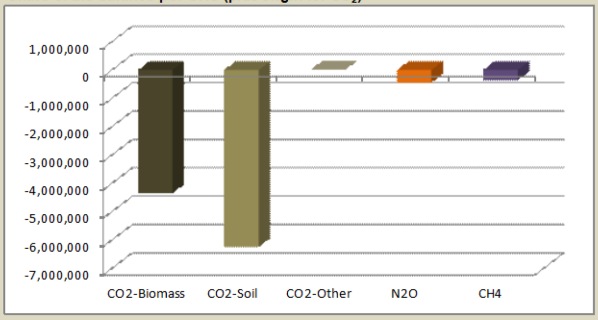




Total without and with project and balance



Share of the balance per GHG (plus origin for CO_2)



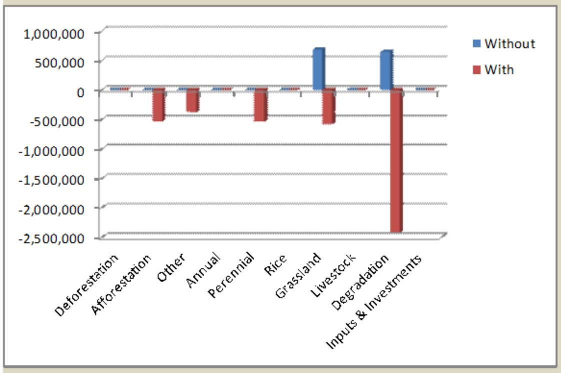
Surfaces evolutions by land use / category (hectares - ha)		State at the beginning	Without Project	With Project
Forest/Plantation		573,192	573,192	575,042
	Annual	3,000	3,000	0
Cropland	Perennial	0	0	3,740

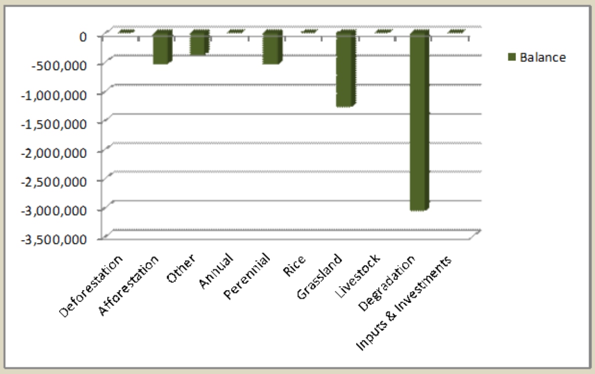
Uncertainty level	
Net balance	-11,390,132
Total uncert.	4,661,285
% of uncertain	41

Annex 2B : Framework of results: Pessimistic scenario

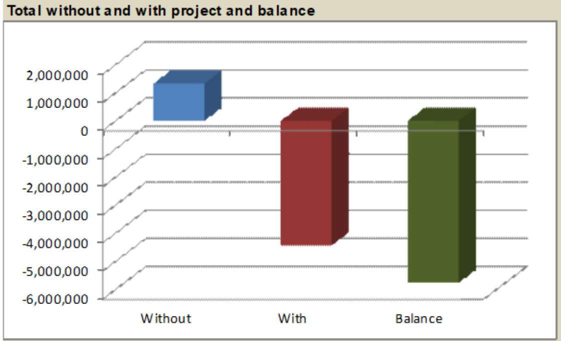
Name of the project	ESP Albania	Climate	Warm Temperate (Moist)	Duration (yr)	20
Continent	Eastern Europe	Soil	HAC Soils	Total area (ha)	437584

Component of the project	Gross fluxes Without	With	Balance	Share per GHG of the Balance, Result per GHG, CO_2 Biomass	Soil	Other	N_2O	CH_4	Results per year without	with	Balance
	All GHG in tCO_2eq, Positive = source / negative = sink										
Land Use Changes											
Deforestation	0	0	0	0	0		0	0	0	0	0
Afforestation	0	-532,734	-532,734	-182,782	-349,952		0	0	0	-26,637	-26,637
Other	0	-373,636	-373,636	28,915	-402,551		0	0	0	-18,682	-18,682
Agriculture											
Annual	0	0	0	0	0		0	0	0	0	0
Perennial	0	-535,381	-535,381	-489,566	-45,815		0	0	0	-26,769	-26,769
Rice	0	0	0	0	0		0	0	0	0	0
Grassland & Livestocks											
Grassland	685,577	-583,239	-1,268,815	0	-985,396		-162,704	-120,716	34,279	-29,162	-63,441
Livestock	0	0	0				0	0	0	0	0
Degradation	648,849	-2,409,509	-3,058,358	-2,289,891	-705,905		-28,123	-34,439	32,442	-120,475	-152,918
Inputs & Investments	0	0	0			0	0		0	0	0
Total	1,334,426	-4,434,499	**-5,768,925**	-2,933,324	-2,489,619	0	-190,827	-155,155	66,721	-221,725	-288,446
Per hectare	3	-10	-13	-6.7	-5.7	-0.4	-0.4	0.0			
Per hectare per year	0.2	-0.5	-0.7	-0.3	-0.3	0.0	0.0	0.0	0.2	-0.5	-0.7

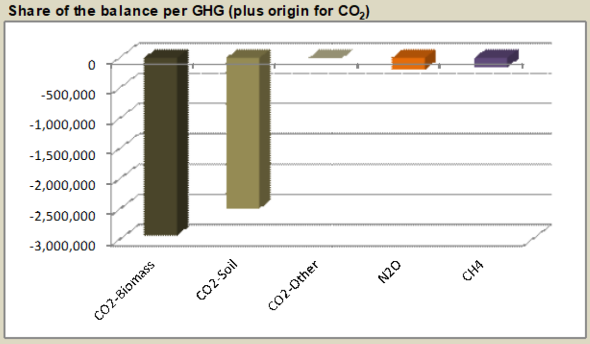




Total without and with project and balance



Share of the balance per GHG (plus origin for CO_2)



Surfaces evolutions by land use / category (hectares - ha)		State at the beginning	Without Project	With Project
Forest/Plantation		286,596	286,596	288,446
	Annual	3,000	3,000	0
Cropland	Perennial	0	0	3,740

Uncertainty level	
Net balance	-5,768,925
Total uncert.	2,223,699
% of uncertain	39

Annex 3: Tentative estimate of Impact of the ESP project on Natural Capital (incremental Economic Value)

INCREMENTAL CAPITAL GENERATED BY THE PROJECT							
Project:	ESP ALBANIA	**1 United States Dollar = 101 Leke (April 2014)**					
	Optimistic scenario	**Units**	**Quantity** (units)	**Economic price (US$)**	**Estimated total Value (US$)**		
Area	867778						
Duration:	20						
	Natural Capital						
Direct private value							
A01	Incremental accumulated SOC on cultivated land (soil fertility)	t C	12,495	$ 11.37	$ 142,068	(i)	
A02	Incremental stocks of non-timber biomass	t dm	1,694,635			(ii)	
	Fuelwood and -material	t dm	121,045	$ 10.00	$ 1,210,453		5%
	Fodder	t dm	242,091	$ 15.00	$ 3,631,360		10%
	Anti-erosive watershed coverage	t dm	1,331,499	$ 1.00	$ 1,331,499		55%
	Compost	t dm	-	$ 5.00	$ -		0%
A03	Incremental stocks of NTFP in forestry and agro-forestry						
Indirect private value							
A04	Incremental area with erosion protection	ha	5,590	$ 94.80	$ 529,932	(iii)	
A05	Incremental area with increased drought resilience	ha	3,740	$ 11.70	$ 43,758	(iv)	
Public value							
A09	Incremental timber stocks in forestry and agro-forestry	t dm	213,609	$ 87.72	$ 18,737,818	(v)	
A10	GHG balance (reduced emissions and C sequestration)	t CO2-e	11,390,132	$ 21.00	$ 100,041,426	(vi)	
A11	Incremental protected natural areas (forestry, peatland, wetland)	ha					
A12	Incremental new forest plantation (existance value)	ha					
	Total natural capital				**$ 125,668,314**		

(i) 1.18 USD/t SOC per year discounted over 20 years (wander Nissen 2013)
(ii) differentiating potential uses: fuelwood, fodder, .. At opportunity prices (Bajcain Shakya 2005)
(iii) based on cost ofcost of soil erosion of 1.32 USD/ton (Acharya 2010)
(iv) based on willingness to pay 2 US$/ha / year discounted on 8 years
(v) timber price derived from international market USD 87.72 per t of timber using European price and US price in 2012 US$ 50 /m3 average divided by 0.57 density
(vi) US Interagency on social cost of carbon in 2013 (21 USD) Eco value computed as NPV (higher value to quick GHG reductions)

INCREMENTAL CAPITAL GENERATED BY THE PROJECT							
Project:	ESP Albania	**1 United States Dollar = 101 (April 2014)**					
	pessimistic scenario	**Units**	**Quantity** (units)	**Economic price (US$)**	**Estimated total Value (US$)**		
Area	437584						
Duration:	20						
	Natural Capital						
Direct private value							
A01	Incremental accumulated SOC on cultivated land (soil fertility)	t C	12,495	$ 11.37	$ 142,068	(i)	
A02	Incremental stocks of non-timber biomass	t dm	1,142,853			(ii)	
	Fuelwood and -material	t dm	81,632	$ 10.00	$ 816,324		5%
	Fodder	t dm	163,265	$ 15.00	$ 2,448,972		10%
	Anti-erosive watershed coverage	t dm	897,956	$ 1.00	$ 897,956		55%
	Compost	t dm	-	$ 5.00	$ -		0%
Indirect private value							
A04	Incremental area with erosion protection	ha	5,590	$ 94.80	$ 529,932	(iii)	
A05	Incremental area with increased drought resilience	ha	3,740	$ 11.70	$ 43,758	(iv)	
Public value							
A09	Incremental timber stocks in forestry and agro-forestry	t dm	144,057	$ 87.72	$ 12,636,694	(v)	
A10	GHG balance (reduced emissions and C sequestration)	t CO2-e	5,768,925	$ 21.00	$ 50,669,423	(vi) NPV	
A11	Incremental protected natural areas (forestry, peatland, wetland)	ha					
A12	Incremental new forest plantation (existance value)	ha					
	Total natural capital				**$ 68,185,128**		

(i) 1.18 USD/t SOC per yuear discounted over 20 years (wander Nissen 2013)
(ii) differentiating potential uses: fuelwood, fodder, .. At opportunity prices (Bajcain Shakya 2005)
(iii) based on cost ofcost of soil erosion of 1.32 USD/ton (Acharya 2010)
(iv) based on willingness to pay 2 US$/ha / year discounted on 8 years
(v) timber vprice derived from international market USD 87.72 per t of timber using European price and US price in 2012 US$ 50 /m3 average divided by 0.57 density
(vi) US Interagency on social cost of carbon in 2013 (21 USD) Eco value computed as NPV (higher value to quick GHG reductions)