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Government of Argentina
Secretariat for Environment and Sustainable Development

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Sustainable Management of Arid and Semi Arid Ecosystems to Combat Desertification in Patagonia
PIMS 2891

Summary

Global dryland assessments place Argentina amongst those countries that have large arid, semi-arid and hyper-arid areas (FAO-IIASA 2000,) with vast areas experiencing land degradation processes. Arid and semi-arid ecosystems make-up 75% of Argentina's territorial land, almost half of which (780,000 km² 30% of the national territory) are located in the Patagonian region. Patagonia is historically famous for its sheep production (wool and meat) that depend on ecosystem services, such as biologically diverse grasslands. Overgrazing, exacerbated by inappropriate land-use and grazing practices, is widely recognised to be the main cause of land degradation and desertification processes in Patagonia. Vegetation loss, reduced species diversity and shifts in species composition alter ecosystem structure and integrity resulting in an expansion of dwarf shrubs and shrubs that have a lower grazing value than grasses and different water capture strategies, thus changing water balances and altering the infiltration and run-off patterns critical to the function of the ecosystem.

In response, the GoA launched the Sustainable Sheep Husbandry Development Programme for the Patagonian region (PDGOSP), whose activities are financed through an innovative sector law, known as the Sheep Law (LO) that provides resources to large, medium and small-scale producers to implement proposed sustainable livestock practices. Concurrently, GoA has developed extensive range management technology (TME) that increases cover, diversity, yields and profitability of ovine operations. The Programme and Law focus principally on increasing economic profitability of producers as a means of reducing grazing pressures. Furthermore, full and effective implementation of these, and up-scaling of TME lessons learnt is impeded by a series of systemic, institutional and individual capacity barriers that limit their contribution to arresting desertification processes in the region.

UNDP and the Secretariat for Environment and Sustainable Development propose a GEF Full Size project that will complement the national and local efforts by: (i) mainstreaming SLM principles into regional land-use planning, decision-making processes, and in the approval procedures for on-the-ground investments; (ii) building institutional and individual capacities at the Federal, Provincial, and local levels; (iii) establishment of a framework and tools for informed decision-making and adaptive management; (iv) broad-based awareness building actions at all levels; and (v) increase stakeholder participation in the implementation of SLM concerns and procedures that will reduce land degradation and consequently combat desertification.

Once completed, the project will mitigate the causes and negative effects of land degradation and as a result strengthen the integrity, stability, functions and services of the ecosystem upon which local residents depend for their livelihoods, thus qualifying in the OP #15 GEF within SLM-2 by creating global benefits through mechanisms to mainstream SLM into investments programmed through the LO and other projects that investments in livestock improvement and extensive management technologies on 6,000,000 ha. of Patagonian rangeland and within SLM-1 by developing policies and capacities at the federal, provincial, and local levels, to plan and implement SLM programs.

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ACRONYMS

To aid in translation and facilitate understanding between languages, acronyms are presented in their Spanish language equivalent accompanied by English language descriptions.

AFP	Argentine Financial Partnership
APN	National Parks Management
CADIC	Austral Scientific Investigation Centre
CAN	Consultancy NAP Commission
CAP	Agrarian Provincial Council (Santa Cruz)
CARNE OVINA	Program for the Development of Commercialization SAGPyA
CD	Steering Committee for PDF-B project
CDR	Rural Development Commission
CE	Project Steering Committee
CENPAT	National Centre of Patagonia
CERZOS	Arid Zone Investigation Centre
CFA	Federal Council of Agriculture
CNA	National Agriculture Cense
COFEMA	Federal Council for Environment
CONAE	National Commission for Space Activities
CONICET	National Council for Scientific and Technical Investigations
CORFO	Corporation for Promotion (Chubut)
CPP	Coordinator for Project preparation
CR	Rural Change
CRA	Rural Confederations of Argentine
DAO	Organizational Scope Description
DCI	Institutional Capacity Deficit
DN	National Director
DNDA	National Direction for Agricultural Development
DSS	Decision Support System

ENTE	South Region Development Entity (Río Negro)
EPP	Country Scheme Program
FA	Agriculture Federation
FAM	Municipalities Federations of Argentine
FAO	Food and Agriculture Organization of the United Nations
FERCOSUR	South Region Coop. Federation
FIDA	Agricultural Development International Fund - FAO
FMAM	World Environment Fund
GEF	Global Environment Fund
GM	Global Mechanism
GoA	Government of Argentine
GTZ	Agency of German Cooperation
IADIZA	Argentine Institute for Investigation in Arid Zones
IBPGR	International Board Phyto-genetic Resources
IFEVA.	Institute for Ecological and Physiological Investigations related to Agriculture
INAI	National Institute for Indigenous Issues
INTA	National Institute of Agricultural Technology
LADA	Land Degradation in Arid Zones Evaluation
LO	Sheep Law (25.422)
LUDEPA SME	Fight against Desertification in Patagonia – Ecologic Monitoring System
MARA	Environmental Monitoring System of Arid and Semiarid Zones
MML	Logical Framework Methodology
MRECIC	Ministry of Foreign Affairs, International Commerce and Worship
NAP	National Action Programme for Combating

	Desertification
NEX	National Execution
ONG	Non-governmental Organization
PATAGONIA SIGLO XXI	Report of External Consultancy on Desertification in Patagonia
PDF-B	Project Development Facility-Block B
PDGLS	Livestock Farm Development Program of South Line (Rio Negro)
PDGOSP	Sustainable Sheep Husbandry Development Programme in Patagonia (Sheep Law 25.422)
PO-15	Operational 15 Program
PRODEFER	Federal Program for Sustainable Development support
PRODERPA	Patagonian Rural Development Project-IFAD
PRODESAR	Project to Combat Desertification in Patagonia (INTA-GTZ)
PRODOC	Final Document submitted to FMAM
PROFAM	Rural Family Development Program
PROGRAMA MOHAIR	SAGPyA Development Program
PROINDER	Small agricultural producers development program
PROLANA	Wool Quality Improvement Assistance Program
PROVINCIAS	Tierra del Fuego, Antarctica e South Atlantic Islands, Sur, Santa Cruz, Chubut, Río Negro, Neuquén y La Pampa
PSA	Agriculture Social Plan
PTA	Annual Work Plan
RA	Argentine Republic
REPAM	Sustainable Management Patagonia's Network
RIOD	International NGO's Network on Desertification

SAGPyA	Secretariat of Agriculture, Livestock, Fisheries and Food
SAyDS	Secretariat for the Environment and Sustainable Development
SCP	Permanent Training Program
SENASA	National Sanitary and Quality Agro-Nutrition Service
SEPP	Executive Ministry for Project Execution
SIG	Geographical Information System
SIPIM-PROLANA	Service of Wool Prices and Markets
SITT	Transfer of Technology Integral Participative System
SLM	Sustainable Land Management
DSS	Decisions Support System
TdR	Terms of Reference
TME	Extensive Management Technology
UBA	Buenos Aires National University
UE	REPAM executing Unit
UEP	Provincial Executing Unit
UNC	Comahue National University
UNCCD	United Nations Convention to Combat Desertification and Mitigate Drought Effects
UNDP	United Nations Development Program
UNPA	Austral Patagonia National University
UNS	National South University
UNSB	San Juan Bosco de la Patagonia University
UPP	Project Preparation Unit
FRAO	Ovine Activity Recuperation Fund

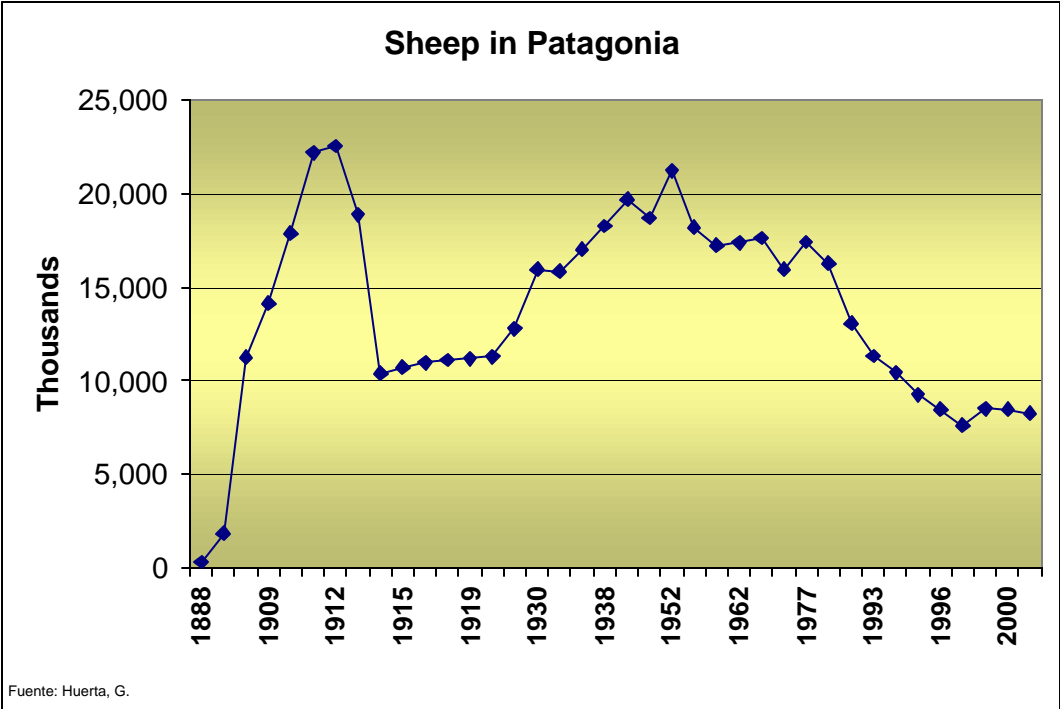
SECTION I: ELABORATION OF THE NARRATIVE

PART I. Situation Analysis

Context and Global Importance

1. Global dryland assessments place Argentina amongst those countries that have large arid, semi-arid and hyper-arid areas (FAO-IIASA 2000,) whose vast areas are under broad-scale land degradation processes. Arid and semi-arid ecosystems make-up 75% of Argentine territory (Map 1 and Map 2), almost half of which (780,000 km² or 30% of the national territory) is located in Patagonia. In spite of its harsh conditions, Patagonia is historically famous for the wool and meat produced in this vast rangeland. For over a century, the profitability of the livestock industry was the driving force for colonization, in spite of the harsh conditions of the area. By 1950, stocking peaked at almost 20M head with 95% of stock found in Southern Patagonia. In addition, northern Patagonia hosts 94% of the 3.92 M cattle stock and virtually all of the country's 0.90 M goat stock. Due to environmental degradation, a 20% reduction in carrying capacity, a 20% reduction in wool prices over 5 decades, and a 48% increase in costs of production (mainly labour costs), Patagonian sheep herds have declined to 8M head in the last decade with almost 12-18% of the breeders abandoning their ranches causing up to a 47% reduction in rural employment in the Patagonian provinces with significant environmental and social effects.

Figure 1: Sheep Production in Patagonia



2. Originally, the sheep industry was transplanted from Europe and from the humid Pampa region in the north. Livestock was added as far as the range would support it without the knowledge of the limits and characteristics of the new environment. As stocking rates exceeded the availability and capacity of the local ecosystems, the local ecosystem degraded to the point of permanent damage. As more livestock concentrated into remaining areas of quality pasture, a spiral of land degradation resulted. With a reduction in ecosystem productivity, historical management strategies are no longer appropriate, threatening the remaining resource and making the breeders more vulnerable to fluctuations in the market.

3. Overgrazing leads to the loss of the most palatable and diverse grasslands, causing the expansion of dwarf shrubs and shrubs that are less palatable and have a lower grazing value than grasses. The result is a simplified ecosystem characterized by reduced species diversity, shifts in species composition, and ultimately altered ecosystem structure and integrity. Given the different water capture strategies of shrubs, water balances are changed, altering the infiltration and run-off patterns critical to the function and services of the ecosystem. Patagonia is interspersed with wetland meadows, or “*mallines*”, which are wetland areas of richer and softer grasses forming bollocks and natural oasis that play a critical role in the water balances of the region and are important feeding and watering areas for livestock. Their delicate hydrology is immediately altered by removal of the vegetative cover and compaction leading to runoff and evaporation, low water capture, and eventual drying of the wetland and structural damage such as sinkholes or cave-ins, making these areas particularly susceptible to degradation processes. The pattern of land degradation is therefore not uniform nor is it related to herd size *per se*. It is a range management and more specifically a distribution problem that must be mitigated.

4. In extreme cases, intense grazing has led to the extinction of the preferred species and to those less tolerant to disturbance (Oliva, et al, 1998). Seventy-five plant species are recorded as endangered due to degradation of grazing environments in Patagonia (Soriano, et al, 1995). As the natural patterns of the landscape are altered, a net loss of nutrients occurs as sink patches are lost. Structural changes in combination with climatic factors and soil characteristics, increase land degradation which in turn has led to further fragmentation of the Patagonian landscape, both in the plateau and more humid areas. Formation of dunes, gullies and desert pavements further disrupts ecological functions and severely impedes the ability of the ecosystems to recover, in addition to the loss of ecological services and functions, including that of carbon capture and storage¹ and habitat for globally important species.

5. It would appear that livestock reduction or abandonment of ranches would lead to the recovery of the ecosystem by eliminating the pressures on the land base. However, within ecosystems such as the central steppe ecosystem, decades of rest have not resulted in recovery or in improvements to the physical and biological aspects of these fragile rangelands. It is now understood that most vegetation and soil transitions are irreversible. Almost 12% of Patagonian territory (10,000,000 Ha.) has surpassed the ability of the ecosystem to recover.

³ The IPCC report (2000) estimates that carbon stocks in temperate rangelands represent 10% of the total carbon in vegetation and soils of the world. In rangelands more than 95% of the carbon is found in the soil. When this is severely degraded through desertification processes, the capture and retention of carbon is reduced significantly.

6. Studies on changes in plant composition associated with grazing in Patagonia show that the numbers of species can be maintained, or even rise slightly with moderate or intermittent levels of interventions, but not when this disturbance or the grazing systems are intense or permanent (Paruelo et al, SAyDS, 1999, DHV Consortium, 1999). Thus, moderate grazing seems not to endanger species composition, but intense grazing does. The land degradation witnessed in the remaining 85% of Patagonia is recoverable through sensible and scientifically validated management. The GoA has invested heavily in the investigation and development of appropriate range management technologies that will both sustain production and maintain the diversity and function of the local ecosystems. These technologies, denominated extensive management technology or TME for its Spanish acronym, have been designed, tested, and validated for small, medium, and large producers. In recognition that Patagonian ecosystems are easily damaged by overgrazing, these practices conform to the extensive nature of the production systems in Patagonia and to the needs of the ecosystem by providing management guidelines that are adaptable to the situation of the individual producer and to the characteristics of the local ecosystem. These practices (described more completely below) involve objective range forage evaluation, stocking adjustments based on range and weather conditions, better protection of ewes and lambs at critical times, and other good production practices that have enabled breeders obtain 18-33% higher net income than those obtained by traditional management.

7. Although land degradation can be avoided through these practices, under the present socio-economic conditions, only 3% of the breeders have adopted TME practices on about 2 M Ha. This low percentage is explained by the strong traditional component of sheep production, the weaknesses of the extension services, the disperse nature of the small-scale producers, the negative impact of incentives without sustainable management requirements, the lack of a common vision on SLM between institutions, programs and projects, and the negative economic results that prevented farmers from seeking technical advice.

8. At the concept stage, other forces that contribute to land degradation were recognized, such as shrub removal for firewood, the effects of introduced animal and plant species, oil extraction and distribution, and mining, that produce more concentrated impacts that affect vegetative cover and soil and water quality. During the PDF-B phase, livestock production was widely recognised to be the main sector responsible for land degradation processes on a broad scale, thus reducing the capacity of arid and semi-arid ecosystems as goods and service providers. However, mechanisms created under this GEF project will enable the dialogue on the other issues at the provincial level (see systems boundary).

Environmental context (see also Section IV, Part III for data on the socio-economic and environmental conditions in the project area).

9. Often referred to as a harsh, cold, semi-desertic region, much of Patagonia has annual temperatures below 10⁰C and rainfall levels of 150 mm. Patagonia spans more than 33⁰ in latitude and ranges from 0 to 3,800 m.a.s.l. with considerable physical heterogeneity demonstrating a mosaic of arid and semi-arid areas. The region is interspersed with humid zones called “mallines”. Of the eleven different bio-zones distinguished, seven are arid-scrub or grasslands (Paruelo, Jobágyy and Sala, 1998). These ecosystems support a diversity of species with a high rate of endemism². Grassland and shrub formations dominate the region, with the

² 12 genera and 283 endemic species with 50 considered “endangered”. (Soriano, et al 1995)

Patagonia Steppe eco-region alone constituting 60% of the area (475,000 km²). This eco-region has been flagged as top priority for conservation in Latin America and the Caribbean region for its global significance (Dinerstein et al 1995) and has also been included in WWF's Global 200 programme (WWF, 1997).

10. Patagonia comprises 3 distinct ecosystems: the mountainous **Andean Region**, where the climate is humid, the **Irrigated Valleys** and the **Arid Region**, which comprises mountains, plateaus and plains and has a semi-arid to arid climate (maps 5 and 6). The Patagonian climate is mainly dominated by air masses from the Pacific (Paruelo et al., 1998), generating a Mediterranean type rainfall pattern with a winter rainy season. In the north-eastern and southern Patagonia the climate is also affected by the Atlantic Ocean with no definite yearly rainfall pattern. Annual rainfall varies from over 2000 mm in some parts of the Andean Region to less than 200 mm in the Extra Andean Region. With the exception of the Monte sector, mean annual temperatures are below 10°C. The impact of overgrazing is more significant in the fragile and dry arid region. The **Arid** Patagonian region belongs to the Patagonian and Monte Phyto-geographic provinces (Cabrera, 1971; León et al., 1998). The latter covers about 25 % of the region, in the north-east with a mean annual temperature of 14 to 16°C, as opposed to the Patagonian Phyto-geographic province that demonstrates a mean annual temperature of 8 to 10°C.

11. Recent studies in the 6 target provinces indicate that much of the Patagonian region is under different degrees of desertification processes, providing clear signs that the integrity of these ecosystems is being severely undermined. Using soil erosion as a parameter, 4 to 28% of the region is eroded³. Using a broader multi-parameter measurement, adapted from FAO for determining the degree of desertification processes, figures are still more disturbing. Including vegetation cover, wind erosion, water erosion, dominant species, and soil profiles in the first 40 cm, desertification processes affect an estimated 625,000 km² or 85% of Patagonia (DHV Consortium, 1999) with 31.8% with very severe degrees of desertification, 52.6% medium to medium/severe and 9.3% low levels (Map 3. PRODESAR, Project Del Valle et al, 1998). Land degradation is unquestionably one of the most urgent issues in Argentina's fight to combat desertification⁴ and alleviate poverty. (See also Table 22 for a list of ecosystems and persistent impacts associated with sector activities).

Socioeconomic context

12. Livestock producers are stratified socio-economically. The small-scale producers operate in Northern Patagonia with a population of 1.5 million in the La Pampa, Rio Negro and Neuquén provinces. Large producers operate in Southern Patagonia with a population of 0.7 million in the provinces of Chubut, Santa Cruz and Tierra del Fuego. The majority population is centred largely in small towns with 17% living in rural areas. Of the 13,634 livestock producers living in Patagonia, 81% are small-scale and native producers with flocks below 2000 head. This group accounts for 17% to the total number of Ha. under livestock management. Of this group, approximately 2,000 breeders (roughly 15% of total breeders) are transhumant, meaning that they migrate from their base to seasonal pastures in the upper Andean valleys in the summer and

³ La Pampa: 4%, Neuquén: 15%, Rio Negro: 25%, Chubut: 25%, Santa Cruz: 28%, Tierra del Fuego: 28%

⁴ The concept of "desertification" is used in accordance with the UNCCD definition of this term.

later descend to their winter pastures. The remaining 16% are medium-scale producers with flocks between 2,000 and 6,000 head, occupying 25% of the estimated rangeland. The remaining 3% are the large producers who manage 58% of the rangeland. Bovine producers, demonstrate similar trends but with more modest numbers. For example, 3% of the breeders control 39% of the bovine population while 70% of the breeders control only 5%. At present, the region's breeders produce 8.4 M sheep, 0.9 M goats and 0.8 M cattle. The following tables provide an estimate of the territorial extensions and production capacity for different classes of breeders.

Table 1a. Livestock interventions by scale and extension

		Small	Medium	Large
	Ha.	< 2,500 Ha	2,500 to 10.000 Ha.	> de 10.000 ha
Patagonia	75,512,756	13,281,569	18,918,883	43,312,304
Chubut	19,955,261	2,017,803	5,336,036	12,601,423
La Pampa	12,735,009	4,152,141	5,229,159	3,353,710
Neuquén	3,345,700	1,501,518	411,784	1,432,398
Río Negro	18,421,117	5,552,079	6,277,654	6,591,384
Santa Cruz	19,884,036	48,233	1,525,105	18,310,699
Tierra del Fuego	1,171,633	9,796	139,146	1,022,691

Fuente: Huerta, G en base a INDEC, Censo Nacional Agropecuario 2002

Table 1b: Number of ranches by province and by stocking levels

Provinces	Range:	1001 a	2001 a	4001 a	>6001	Total	
	1 a1000	2000	4000	6000			
La Pampa	1,725.00	8.00	2.00	0.00	0.00	1,735.00	
Chubut	1,453.00	528.00	511.00	175.00	141.00	2,808.00	
Rio Negro	3,004.00	661.00	482.00	168.00	190.00	4,505.00	
Neuquen	3,086.00	292.00	80.00	30.00	53.00	3,541.00	
Santa Cruz	157.00	180.00	290.00	177.00	184.00	988.00	
Tierra del Fuego		7.00	4.00	10.00	36.00	57.00	
Patagonia	EAPs	9,425.00	1,676.00	1,369.00	560.00	604.00	13,634.00

13. *Small-scale production:* Small-scale producers manage mixed livestock system with about 15 cattle for meat, 60 sheep, 200 goats and 15 horses. They operate on private property or on legally consigned lands, mostly without subdivisions and often without fencing that would enable them to better divide their management time and energy, protect sensitive areas, or protect their ewes during lambing. As a result, weaning percentages are low, averaging about 50% for sheep and 80% for goats, thereby sacrificing crucial income. The meat from the operation is therefore dedicated to self-consumption and/or flock maintenance qualifying them as subsistence-type breeders. They maintain one-room clay houses for their families often without floors without access to electricity and gas. The typical family will have about 6-7 family members whose access to health care is limited due to a lack of hospitals in the rural zones far

from towns. The rural road infrastructure is an earth road that is impassable in winter. Horseback is the main mode of transportation with public transportation being used only periodically. They generally exist outside of the cash economy, bartering for goods and services. They sell their labour in their spare time to generate cash. Illiteracy is estimated at 70%. They are frequently of native origin and rely heavily on family labour for tending flocks. This group uses mostly local or “criollo” breeds with little application of range management techniques. Among the indigenous groups, much of their traditional pastoral knowledge is outdated due to historic demographic changes. Over centuries, their access to rangeland was diminished to the point where their traditional livestock management was no longer applicable in a greatly reduced area. As mentioned in paragraph 12, a small portion of these breeders are transhumant. This population has benefited from baseline programs to provide basic social services and schooling to this migratory group (see baseline analysis). In general, the small flock size, low incomes, and the distances that separate the small producers from towns limit their access to programs, incentives, or subsidies for which they may qualify, including LO benefits. A percentage of these breeders belong to rural co-operatives that provide technical assistance and access to programs and projects. Participation is low in these social structures (see barriers) but can be improved to generate to enhance the accessibility of this sector.

14. *Medium-scale farmers*: As mentioned above, the mid-size ranches, though less in number influence a greater land base than the small-scale producers located mainly in Tierra del Fuego, Estepa Magallánica (South of Santa Cruz), Chubut and Río Negro. Houses on the ranches are adequate with adequate sanitation facilities for the family. Part of the population of mid-size producers lives in cities, and relies on off-farm activities to complement their income. They have access to health care facilities and usually have a vehicle for their transportation. The owner has a high school level of education with sufficient income to send their children to the university. They are members of Rural Societies, which are stockmen’s associations that connect them to policies, incentives, and projects. They have a much better developed ranch infrastructure that facilitates shearing, lambing, and rotational grazing. They tend to manage improved breeds such as, Corriedale or Merino, on private property. They employ ranch hands for a portion of the labour. The ranch generally has windmills for water extraction. Production is oriented to both meat and wool. Weaning percentages are approximately 65% and each animal produces 4.5 kg of wool. The rangelands are usually overstocked, with transitions of dominant bunchgrasses to dwarf shrub-lands. Producers are usually receptive to new farming practices.

15. *Large farms*: these are large *estancias*, both privately and corporately owned, located mainly in T. del Fuego and Santa Cruz and to a lesser extent in the other provinces. Stocking ranges from 6,000 to 20,000 heads. Weaning percentages are approximately 60-70% and each animal produces 4.5 kg of wool. Production is oriented to lamb meat and wool. Facilities include full border fences and the necessary number of paddocks, a full shearing shed, windmills and comfortable houses. Many of these farms are incorporated as businesses and have an established supply chain with professional administration. There is absentee ownership with owners living in large cities, especially Buenos Aires.

16. These farmers rely on sheep as their main source of income but focus more on tending the sheep than on rangeland management, which requires a greater understanding of vegetation, soil

and ecosystem function. Initial stocking rates were overestimated during colonization and maintained by tradition. Due to land degradation, the carrying capacity of many of these lands has decreased. As farmers seek to gain incomes from this one activity, many have flocks larger than the carrying capacity of their farms, leading to more overgrazing. With lowered profitability and increased degradation, the majority of the small-scale, subsistence farms live in conditions of extreme poverty. While sheep-rearing once provided significant inputs to regional incomes, it now represents only 1% of the region's Gross Domestic Product.

17. The decline in the industry has had other socio-economic effects. The following table demonstrates that rural employment for ranch hands has diminished between 27 and 32% since 1988 (INDEC, 1988 and 2002), which implies an annual loss of 15 M USD to the local economies of the provincial towns. There is no adequate assessment of the additional economic effect on the volume of the local economies as a result of the decline.

Table 2: Changes in full-time contracted ranch employment

Province	Year	No of employees	% change
Neuquén	1988	4,319	
	2002	2,933	-32%
Rio Negro	1988	10,129	
	2002	7,350	-27%
Chubut	1988	4,042	
	2002	2,572	-36%
Santa Cruz	1988	2,686	
	2002	1,436	-47%
Tierra del Fuego	1988	528	
	2002	352	-33%

Source: Huerta, G.; based on the National Agricultural Census, INDEC; 1988 y 2002.

18. Additional negative social effects have been rural emigration to urban areas that cost each province or the capital an estimated \$6,000 USD per immigrant in the establishment of basic service establishment such as water and gas hook-ups, emergency services, and protection. The local effect of small and medium processing facilities related to the reduction in the livestock sector is not available for the provinces. Populations in vast areas have become very low in this already sparsely populated area. With a present overall population density of 1.9 inhabitants/km² in degraded areas this has dropped to 0,5 inhabitant km². In spite of the vast economic and social problems caused by land degradation on the productive systems of the provinces, society is still not aware of the scale deterioration, and does not share a unified vision for the future of the rangelands.

Institutional, sectoral and policy context

Institutional context

19. Argentina is a federation with self-governed provinces. Each Patagonian province is responsible for the administration and management and conservation of their natural resources. Each province includes ministries of production and environment, extension services, programs

and projects. These structures are in direct contact with breeders and channel credits, subsidies and access to social services. They are the local focal points for LO. Although every province has production and environment oriented departments there are differences in the types of structures, mechanisms, and approaches to land management. In general, there is a deficiency in capacities for planning and management of natural resources. Many of the local organizations have not been coordinated, equipped and trained in order to understand, guide and monitor the application of TME in range management.

20. At the federal level, several institutions have roles in the development of the livestock sector and for the overall GEF project. SAyDS is the focal point for this project and shares a role with the Secretariat of Agriculture on the executive committee (CD). SAyDS is connected to the provincial authorities mainly through a council of environmental ministries (COFEMA) which includes representatives from environment ministries of each province. SAyDS is also responsible for programs on desertification, soil conservation, biodiversity and climate change within the context of the NAP. The SAGPyA is related to the provincial governments through programs, projects, emergency relief, and the establishment of credit and subsidies. SAGPyA, on the other hand, is the implementing agency for the LO. The Institute for Agricultural Technology (INTA) is the technological arm of SAGPyA. It has 7 Experimental Stations and 30 Extension agencies distributed along Patagonia. They are the developers of production technologies, including TME, (described below), which is a suite of the techniques and practices to increase the productivity of extensive grazing systems. Extension services are however not sufficient at the ground level and not coordinated with the provincial programmes.

21. In terms of social capital to support upstream and downstream movement of information, coordination, and participation, there are many networks and associations of breeders that are organized according to geographical and/or economic interest. Large and medium breeders gather within the scope of “rural societies” (*Sociedad Rural Argentina*), whereas medium-size producers are usually members of federations incorporated within “Confederaciones Rurales Argentinas”. At the local level, some small breeders are organized into cooperatives and these into federations of cooperatives. Many of the cooperatives and associations unfortunately unite only a small part of the breeders. These institutions however have been supported by several projects, such as PSA and PROINDER (see baseline analysis) to include professional management and/or technical assistance. Two organizations are of particular relevance for the purpose of this project are: (1) the Argentine agrarian federation (*Federación Agraria Argentina*), which represents small producers, and National Forum of Family Producers (*Mesa Nacional de Productores Familiares*), which unites community-based organizations and very small groups of farmers and breeders; and (2) indigenous groups are represented at national level by the National Institute for Indigenous Affairs (INAI). Please refer to the stakeholder analysis for information on the role of these institutions and stakeholders within the decision-making framework of the project.

Political context

22. The political framework consists of the National Constitution that introduced the environmental thematic concerns in the 1994 reform. Consistent with that law, Argentina has

subscribed to international conventions that will ultimately strengthen the national environment and processes consistent with the General Environment Law. The SAyDS is the maximum authority and political focal point. Environmental development policies are outlined in two documents prepared during 2004-2005 period: the Environment National Agenda and GEO ARGENTI NA. In addition to the Millennium Development Objectives, the country developed the NAP that provides the political context for combating desertification in which Patagonia plays a fundamental role. The context for the participation of productive sectors within the NAP framework is established by a joint planning and cooperation agreement between SAGPyA and SAyDS for the harmonization of PDGOSP activities within the scope of the NAP. This agreement further establishes the context for inter-agency coordination and cooperation that will facilitate the GEF FSP. Furthermore, the harmonization of productive actions within the NAP contributes to GoA efforts to accomplish the UNCCD goals by responding to the main causes of desertification in a vast arid region known to be subject to broad-scale land degradation and desertification processes and enables the removal of the barriers for the implementation of SLM.

23. The political context at the Provincial level is established by the Patagonian Parliament (PARLAMENTO PATAGONICO), which establishes Pan-Patagonian communication and coordination at the legislative level and through representatives of each provincial parliament as designated to the Federal Environmental Council (COFEMA), which is part of a federal pact that gathers all environmental structures from the provincial level providing provincial representatives with access to the Secretariat of Environment. To assure that the project fit within the political context of both the nation and of the provincial governments, COFEMA was consulted on the development of this project and conversely, many CODEMA representatives participated as members of the project preparation unit (UPP) during the design phase.

24. The specific political and legal context for the project is the National Law for Recovery of Sheep Livestock (# 25,422), known as the LO, provides a financial mechanism to channel national resources through both grants and credit schemes to medium and small-size sheep farmers for the implementation of sustainable livestock practices outlined in PDGOSP, which includes TME (discussed below). It commits to providing Federal resources for the next ten years with an estimated US\$ 4.62 million available for Patagonia annually. The funds accumulated from credit payback will constitute a revolving fund that will provide additional credits and ensure LO actions beyond 2010. The LO is coordinated by SAGPyA through the Under-secretariat of Agriculture, Livestock, and Forestry and by a Consultative Committee with representation of provincial governments and breeders and through a regional forum for the discussion of strategies. The LO operates at the provincial level through a Project Execution Unit (UEP) that is established in each province and comprised of three representatives from: (1) the ministry of production, (2) SAGPyA (INTA) and, (3) one representative of the production sector. The inclusion of a fourth member representing the environment ministry within the UEP is currently under negotiation to enable that operative structures as a local steering committees for the implementation of the FSP.

25. The political context for the project is complemented by additional national laws such as Law 22.428 for Conservation and Recovery of Productive Soil Capacity and National Law 24.375, Law on Biologic Diversity.

The Sector Context

26. The project is set within the livestock management and environment sectors by uniting support through cooperative agreements (paragraph 22) and through multi-level coordination (paragraph 23). The GEF FSP will contribute to the development of environmental benefits and towards additional indirect global benefits that will complement the following sector development initiatives (see baseline analysis for a more complete description):

- PDGOSP-SAGPyA (Ley Ovina 25.422) amplifies the country's platform for the modernization of productive systems within the framework of sustainable livestock and pasture management. PDGOSP seeks to improve farmers' profitability through: (a) improving profits and competitiveness of farms by improving profits and systems of trade (e.g. organic production and improvements in wool quality); b) increasing the adaptation, scaling, and adoption of TME and training of farmers and technicians in its use; c) diversifying production alternatives such as sheep dairy farms or the production of native species; d) promoting better use of natural resources, for example, protecting *mallines* areas, dividing large paddocks, installing water holes; e) developing associations of small farmers.
- The PSA-SAGPyA is a permanent program directed to small producers that seeks to overcome financial, productive and social restrictions through the development of organizations (social capital) that will include otherwise remote individuals into sector programs.
- The PROINDER (GoA-BM) complements PSA actions by improving the quality of life of poor rural families of small producers while the PROLANA-SAGPyA project works towards the improvement of wool quality, its presentation and market conditions with the Wool Price and Market Service (SIPIM) as a service for the sheep stock farmers producers. The program for the management and sustainable use of wild species - SAyDS, control of exotic species and promotion for the sustainable use of the Choique and Guanaco attempts to develop alternate production of natural species.
- The regional program PRODERPA-FIDA-SAGPyA (in approval phase by the GoA) will improve economic integration and access to new commercial possibilities within a framework of gender and youth equity in four Patagonian provinces.

27. Please note that additional projects and sector accomplishments that contribute to this initiative are mentioned in the baseline analysis.

TME Within The Sector Context

28. All grazing systems in Patagonia are extensive grazing systems. Even where paddocks and fences are used, management cells of less than 2,000 Ha. are not common, ranking these as extremely large areas in comparison to countries that promote intensive management units of

100-500 Ha. and below. INTA, as part of the PRODESAR program, developed systems that have been validated with all producers, small, medium, and large using techniques that are adaptable to any ecosystem and to the conditions of individual breeders. In general, TME methods regulate stocking rates in continuous or summer/winter grazing systems using range management methods that rely on rotational use strategies (Golluscio 1998). These systems are of the “low intensity-low frequency” type, as opposed to other models that concentrate animals in a “high intensity-low frequency” schemes.

29. Properly managed rangelands with continuous or seasonal grazing are very different from the actual overstocked and under-managed systems characteristic of the baseline situation. TME recommends actions to breeders based on range evaluations, many of which can be undertaken by the breeders themselves that enable the use of specific rotational measures where appropriate. In small scale systems, temporary structures such as fences and paddocking is recommended for protection of ewes, while in large and medium ranches the incorporation of more and/or better paddocking is used as an improved management tool for those extensive systems, without transforming them in intensive systems⁵, which mirror the present overstocked situation and require more labour and infrastructure, that would be neither acceptable nor sustainable from an economic or social point of view

30. TME systems, particularly for small-scale situations, were developed and tried extensively in the PRODESAR (INTA-GTZ) program between 1994 and 2004 in the Lipetren area of Rio Negro, in Chubut and in Neuquen (see also p. 98). In this area within a typical mixed sheep, cattle, goat and horse system, TME models applied forage evaluation and corresponding stocking adjustment as necessary. Small scale infrastructure such as electric fencing of meadows and lambing shelters, allow for forage deferment for a better nutrition of ewes at lambing, and better protection from climatic conditions and from predators. The improved model can demonstrate weaning percentages of 80% and 100% in sheep and goats respectively, which increases profitability and generates a surplus for sale. Range management is improved because meadows are rested and animals have a better distribution.

31. Examples of TME models for a similar system for mid-size or large producers would include: annual range forage evaluation, stocking rate and animal distribution adjustments, pre-weaning shearing, sanitary management, genetic improvement, forage supplementation and winter feeding. Farms with adjusted stocking rates usually maintain total wool production because of increased individual animal production indexes, and increase yield. Weaning percentages increase to 75%, so that a lamb surplus is generated for sale. Please refer to Section IV part VII for additional scenarios and results of TME for large, medium and small-scale systems.

32. Using TME, breeders obtain 18-33% higher net income than those obtained by traditional management and reduced uncertainty of production. Increase in production is due to reduced mortality and increased individual animal performance that in turn increases number and quality of animals and wool available for sale. These breeders were able to produce enough financial and non-financial returns to meet the expectations of quality and way of life of their families and

⁵ Intensive systems in general imply the concentration of livestock in low quality rangelands, that generates nutritional problems, especially in winter and following blizzards.

dependants (Pickup y Stafford Smith 1993) In addition, an added benefit of risk aversion is generated through local coordination to create pasture reserves, thus mitigating the effects of unexpected events.

33. Although land degradation can be avoided through this type of range management, under the present socio-economic conditions, only 3% of the breeders over about 2 M Ha. have adopted TME practices. This low percentage is explained by the strong traditional component of sheep production, the weaknesses of the extension services, the negative impact of incentives that have been historically disbursed without sustainable management requirements, the lack of a common vision on SLM between several institutions, programs and projects, and the negative economic results that prevented farmers from seeking technical advice, and gaps in the understanding of the perceptions of numerous groups of breeders throughout Patagonia (see barriers). The number and broad-scale accessibility to technology appropriate to each breeder is important to the broad-scale response to the factors that affect land degradation in Patagonia. Contact, enhanced participation, and feedback by breeders of all categories will be important to adapting a demand driven response to the multiple productive systems and ecosystems in Patagonia.

34. TME is not a panacea. Primarily, TME is size-dependant and also sensitive to the level of productivity and degradation. With optimal forage allocation some farms do not achieve enough financial return to be sustainable from the economic point of view. In these cases SLM requires a combination of TME and productive alternatives, or cooperative effort to be successful. Other options exist, such as agro-tourism, a well-developed activity in Patagonia with nearly 100 ranches offering tourism services that benefit from Patagonia's natural and cultural resources and employs family labour are possibilities. Other alternatives such as rearing of native wildlife (guanacos or rheas) are not well developed and may be options for alternative development in the long term.

Threats, Root Causes and Barriers Analysis

35. The problems presented pose 3 principal threats to the stability and function of the ecosystem and to the sustainable livelihoods of those that depend directly on ecosystem services and functions: the first refers to the application of unsustainable production practices and systems; the second is over-dependence on grazing systems for sustained livelihoods; and the third refers to a possible non-sustainable stocking increase in response to better relative market prices and economic incentives.

Threat 1 : Poor range management with respect to flock distribution and overstocking.

36. *Root causes* of this threat are the limited knowledge and awareness of the producers about the signs and effects of degradation of rangelands. Producers are traditional in their management, and their perception of risk includes annual variation of productivity with rainfall and market variations. Slow processes such as grass replacement or topsoil loss that undermine the productivity of rangelands over decades are not noticed. Historical loss of range carrying capacity is explained in terms of climate changes with reduced rainfall. Insufficient attention has been paid to the long experience and adaptation to adverse environmental conditions by the producers of the region who have developed and learnt survival strategies. This is especially true of indigenous groups whose historic experience has been altered as they were confined into smaller and smaller regions. The perceptions of the different breeder groups (small v. medium v.

large scale breeders) are not genuinely understood about how each perceives benefits and risks of possible alternatives for land use, conservation, or improvement of yields.

37. Prior to 1990, conventional wisdom dictated that the poorer farmers lived in marginal lands without means of producing in a productive and environmentally sound fashion, obligated to adopt practices that were damaging by virtue of their accessibility. Later studies have demonstrated that the relationship is much more complex (Agarwal, 1989; Dankelman y Davidson, 1988; UNSO, 1994). Without the tools (access to land, credit) or access to information for adaptive management in the time frames or amounts necessary, an inappropriate *status quo* is maintained. The immediate actors in the land degradation formula do not act irrationally, irresponsibly, or in a premeditative and damaging manner, the role of institutions is also recognized in propagating and supporting the predominant models for economic development (C. Peralta, C. Giraudo y P. Losardo, 2003).

38. *Main barriers*

- There are social capital limitations among large, medium and small producers and their families that limit information exchange and consciousness-raising. Historically, indigenous knowledge of pastoral management was changed as the distribution of those peoples was limited into smaller areas over time, making application of traditional knowledge impractical or forgotten. The absence of a forum for the exchange of ideas on local management is a factor. The education level of the producers is varied by scale of producer. Training in range management is usually informal, and management is learnt with practice, using traditional tools and paradigms. Rural families are not usually targeted on campaigns that reveal the significance of land degradation and the problems in management generated by traditional ways of production.
- There are institutional constraints and limited human resource capability to exchange information and build capacities of producers using existing federal and provincial government extension services. Extension services are weak and uncoordinated. They do not share a common vision on the proper suite of management practices. TME is intended to be an adaptable technology. Therefore, solutions that are locally adapted still require pasture evaluations and exchange of information with the local breeders to determine the exact package and management techniques for a given bio-region and for different types of breeders. There is not a stock solution for each bio-region that could be replicated in a “business-as-usual” strategy, this underscores the need to create social infrastructure and better contact with extension services and incentives to be able to apply to small scale producers larger TME.
- Small producers that do not have land property certification have restricted access to programs and credits. These producers are not well represented in rural associations, and are sometimes organized into cooperatives that connect to Federations where representation is weak. However, many small breeders and transient workers do not belong to cooperatives. Provisions in sheep law will provide benefits and options to cooperatives and greater levels of association needed to include small producers and transient workers.

Threat 2: Overdependence on grazing systems for sustained livelihoods

39. Pastoral systems are vulnerable to external factors such as market prices and climatic fluctuations. Uncertainty reduces profitability of the system, increments poverty, induces migration to seek off-farm income and reduces the level of management available to prevent rangeland degradation.

40. *Root causes* Limited access to information and advice on timing of stocking rate variation increases the probability of losses due to climatic events (droughts, snow storms). The lack of effective alternatives for economic diversification of the farm system, plus market prices that do not favour good practices over inappropriate ones, constitute the root causes that contribute to economic vulnerability.

41. *Main barriers*

- Information needed for technical forecasting and decision-making is incomplete, dispersed and does not reach producers and policy makers in an orderly way. Early warning systems based on existing remote sensing technologies and meteorological models linked with extension services may advise producers in advance of the probability of snowfalls and droughts, so that they can make decisions on forage provision and livestock sales or movement. Provincial governments could apply these systems to apply sanitary help, manage credits, and to direct actions through the National Agricultural Emergency Law 22913, or through the LO, that enable subsidies, tax exemptions, forage provisions or special funding for animal purchase, further reducing uncertainty in production and improving sustainability of rural life. It is expected an increase in variability due to global climatic changes.
- There are information gaps on viable alternative production options for economic diversification of ranches and non-pastoral opportunities. There are experiences on the utilization of wildlife species (guanaco, choique) as alternatives to traditional production that could be disseminated by the extension service. There are also about 100 farms that develop eco-tourism and responsible tourism in the region, and this activity is growing in relation to the development of the tourist sector of Argentina.
- Many rangelands with areas of environmental value are not identified. Mapping in the context of the DSS could guide the establishment of public and private conservation reserves. Experiences and tangible results from conservation alternatives have not been tested or validated for financial and environmental success. No registry of private conservation areas is available, so that conservation initiatives in private lands are informal, do not make long-term commitments, and cannot benefit from incentives as rural custodians or attract tourism.
- Normative actions, policies, criteria, and instruments that enable incentives for SLM and differentiated product protocols are missing at the provincial level. Product certification efforts have been realized in some provinces with organic protocols and certification of origin. These efforts have not led to a price increase or added value to the producer. Further efforts within the extension service, producers associations and provincial governments are needed to develop the added market value of these products. SLM practices have not been detailed in protocols that could enable producers to qualify for awards or incentives.

Threat 3: A non-sustainable stocking increase in response to better relative market prices and economic incentives leads to land degradation.

42. International wool and meat prices have improved in the last years and the devaluation of Argentine currency in 2002 has reduced the relative costs of production of these commodities. In addition, resources of national programs such as LO have become available since 2002, but the capacities to orient these funds to proper range management have not been sufficiently developed. There is a real threat that re-stocking of farms and/or reestablishment of higher stocking levels of sheep production, without TME, will lead to increased threats of range degradation and unsustainable occupation.

43. *Root cause:* There is no shared vision and understanding of the concept of SLM between projects of different agencies. Economic development projects do not take into account the bio-physical aspects of production, including the different potential of rangelands throughout the area.

44. Main Barriers

- There are gaps in knowledge and information on land degradation processes, TME and access to support systems to facilitate decision-makers at provincial level and producers. TME practices have been developed and described in technical manuals, web pages and other documents, but provincial decision-makers and associations of producers have different levels of understanding of them. Data on forage evaluations and animal production of farms under TME is dispersed and not accessible. Long term monitoring techniques and indicators have been developed with LADA and NAP projects but the ground points are not installed so the implication of management decision cannot be evaluated objectively and used to orient decisions.
- There is a lack of awareness of SLM concerns and the role in economic development planning by multiple sectors.
- There is a low connectivity because of distances between implementing organizations and the fact that face to face meetings in Patagonia are cost prohibitive. A capacity deficit survey has identified at least 60 stakeholders that do not interact properly. Environmental and productive aspects of SLM are separated in provincial administrative agencies and extension capacities in federal and provincial agencies are incompletely coordinated. Some effort at inter-institutional coordination has been realized, such as COFEMA, an assembly of provincial environmental agencies, or ENTE LÍNEA SUR that coordinates extension in provincial, federal and producer's institutions of Rio Negro, or the Patagonian Parliament that connects legislators of the 6 provinces. These initiatives are isolated or not formalized into a network, inhibiting a unified view of SLM, the application of appropriate techniques such as TME, and the implications of unsustainable management is if these techniques are not implemented.
- Article 3 of this Law establishes the evaluation of pastures to determine the carrying capacity in the proponent's farm as a prerequisite for resource approval. This evaluation must be undertaken by a Provincial-registered evaluator. The Law also calls for pasture monitoring over time and determines limits for carrying capacity for approval of credits, subsidies, and incentives in livestock management activities. This represents the first time that a livestock-related Law in Argentina has included an environmental

requirement. That requirement is however not entirely operational, lacking policies and tools to implement it on a broad-scale. Missing policies, criteria, and instruments at the provincial and agency level inhibit mainstreaming of TME into Federal and Provincial sector support programs. The LO explicitly requires TME for the allocation of credits and subsidies. Many offices, however lack the tools to do so. PSA and provincial incentives also lack protocols that ensure the inclusion of environmental criteria in the approval process. The decision makers of these projects are partially aware of SLM practices but a general consensus on the issue has not been attained.

Stakeholder Analysis

45. Within the project's target area, there is a diversity of international, national and local institutions and organizations promoting local development that is closely linked to land use management. Section IV, Part V lists the principal partners, describes their participation to this point and presents mechanisms for their potential participation in project implementation. The project preparation unit (UPP) was created as part of a participative process on November 2004 by members of the livestock and environmental sectors from each of the six participating provinces, including specialists from the areas of ovine production, environmental management and experts in natural resources and sustainable management of arid zones in representation of partner agencies. The project steering committee (CD) was created to incorporate the major strategic partners: (1) SAyDS with the Office of Soil Conservation and the Office for the Convention to the Combat against Desertification, the GEF focal point; (2) SAGPyA and its Sub-secretary for Agriculture, Livestock and Forestry, Coordinator for the LO (PDGOSP), (3) the rural development committee (CDR) which monitors all of the PSA/PROINDER/PRODERPA/CAMBIO RURAL projects implemented in the region. (4) representatives from INTA, PDGLS (Río Negro), and others such as SENASA, INAI, the Municipalities of Patagonia, MRECIC, PNUD, National Universities of Patagonia, RIOD-Patagonia, the scientific institutes of CONICET, Patagonian Parliament, PRODERPA-IFAD, WISP, COFEMA, LADA and representatives of large, small and medium producers.

46. The CD of the Project will be in charge of inter-institutional relationships, consensus and diffusion of the actions to the highest political levels and will coordinate with the following stakeholders from multiple levels:

47. International: The bilateral and multinational cooperation agencies working in the geographic area of the project intervention include: UNDP, FAO, LADA, IFAD, GTZ, and GM. All involved in actions closely linked with the project in Patagonia.

48. National: The main national stakeholders include: SAyDS, SAGPyA, UNDP Argentina, MRECIC, and INTA. SAyDS is the implementing partner, who will coordinate with all other stakeholders. During the preparation of the concept paper, the official CCD Focal Point was both involved in the process and accompanied the entire PDF-B process through meetings with the project formulation team and interaction with all main stakeholders. Other representatives included were INAI (indigenous groups), RIOD (NGO network), Producers, Agencies,

Programs and Projects linked with small, medium and big producer's assistance, mainly within SAGPyA/ CDR, in addition to COFEMA (see political context).

49. Local: At provincial level, the stakeholder representatives from both the livestock and environmental sectors participated in the design of the project, including also sector specialists from the areas of ovine production, environmental management and experts in natural resources and sustainable management of arid zones including local representation of partner agencies. In addition, the framework for the participation of project, program and special offices has been negotiated to create participation in the implementation of the project. The main actors are: the UEP of the LO; Patagonian Parliament; Provinces legislators; National Universities; Producers associations (Rural Societies, Federations, and, Cooperatives of Small Producers) and NGOs. There are 15 NGOs working in Patagonia, all of them are members of RIOD. Only four work in relation with small producers. NGOs will be invited to join the REPAM. Indigenous groups are represented within INAI and have a seat in the CD (par.45). The Small scale producers groups have representation in the PDGLS (Livestock Development Programme for the South). This is an imperfect arrangement but it is currently the largest systematic grouping of small producers that enables the project management unit access to this population. As cooperatives are better developed, they will have broader representation through the federation of cooperatives that has a seat in the UEP. Small producers are included as stakeholders within the broader livestock sector and as members of UEP.

Mechanisms and Strategies for to Promote Stakeholder Participation

50. During project implementation, additional formal structures are considered to overcome the great distances in the Patagonia region and the negative effect of those distances on participation, especially at the grassroots level. Patagonia has multiple programs and projects with structures for communication, information, and management at both the province and community levels for many of the major initiatives. The project seeks to take advantage of these existing structures and networks and use them as “nodes” and connect them with project information and services through the Patagonia Network (REPAM). Within REPAM, existing structures will be strengthened to interact within the network and capacity building actions will facilitate the effective and productive participation within the network. The network will serve as a forum of particular interest to the smaller, more remote pastoralists. In addition, REPAM is a subset of a broader NAP network. The REPAM will not be a new structure nor a new bureaucratic organism but rather a new tool to support communication between Patagonia's extensive list of actors.

51. Another structure, complimentary to REPAM, but more technical in scope, is the Integrated Technology Transfer System. This system is the mechanism for harmonizing technologies (like the TME) existing in multiple projects and programs in development throughout the region. The consolidation of different organisms with extension and transfer structures will make this structure a participative node to unify SLM technical criteria directed towards the producers and other beneficiaries of the REPAM.

Baseline Analysis: The Situation Without the GEF Increment.

52. In response to the problems, the GoA has taken significant steps to address land degradation. In 1981, legislation was enacted to promote soil conservation (Law 22,428). This allocated resources to farmers that voluntarily adopted conservation practices and rehabilitated degraded areas. Despite its promising results, in 1989 financial support was suspended due to the economic difficulties of the time. In Patagonia, knowledge and technological instruments for conservation practices were very limited during this period, and the number of farmers benefiting from this Law was minimal. However, during the 1990s, a Project to Combat Desertification in Patagonia (PRODESAR) was implemented by INTA and GTZ. This project developed the low cost integrated technological practices known as TME, described in paragraphs 28-33 and in Section IV Part V. (Borrelli et al 1999, DVC Consortium 1999).

53. Despite these promising results from the PRODESAR project, barriers prevented the contact of all stakeholders with the technology and elements necessary to foment the broad-scale application required to have broad-scale impacts in halting desertification in such a large region. Furthermore, more feedback and exchange with users is needed to arrive at an adaptable, demand-driven initiative based on best practices and combinations for the different bio-zones of the region, particularly for those with lower carrying capacities due to natural, low, productivity of pastures and for groups with small flock sizes.

54. The need for a more comprehensive approach was recognized in the Patagonia XXI Report, 1999⁶. This summarised the causes and effects of desertification in Patagonia and concluded that existing livestock production techniques needed to be modified to revert the process of desertification and attendant ecological degradation. If this does not occur, continued decreases in farm capital, flocks deterioration, and the gradual abandonment of sheep production would continue, leading to further environmental degradation that is now associated with ranch abandonment, such as loss of grassland species diversity, consequent wind erosion, etc. Rural inhabitants would increasingly migrate to urban areas where, with mismatched skills, they would be marginalized from incomes sources and continue to live in conditions of extreme poverty. In order to counteract this process, the report outlines a series of potential solutions. Many of these have been integrated into a ten-year Programme (PDGOSP).

55. The PDGOSP seeks to improve farmers' profitability through a variety of actions including amongst others the following: (a) improving profits and competitiveness of farms by improving prices and trading systems (e.g. organic production and improvements in wool quality); b) increasing the adoption of TME and training of farmers and technicians in its use; c) diversifying production alternatives such as sheep dairy farms or the production of native species; d) promoting better use of natural resources, for example, protecting *mallines* areas, dividing large paddocks, installing water holes; e) developing associations of small farmers. The Programme is to be implemented through the SAGPyA, however this institution has signed an agreement with SAyDS that establishes joint planning and co-operation between both Secretariats facilitating the integration of the PDGOSP with the NAP.

³ Based on research carried out within the framework of the Integrated Forestry Development Project, financed by the World Bank DHV Consortium. 1999

56. The sheep law, mentioned earlier, provides resources to implement this Programme. This law provides a fiduciary mechanism (see paragraphs 117-119 for details) to channel national resources, through both grants and credit schemes, to medium and small-size sheep farmers for the implementation of sustainable livestock practices outlined in PDGOSP, including TME practices. It commits to providing national resources through this Law for the next ten years with an estimated US\$ 2.5 million available for Patagonia annually. These disbursements depend on pasture evaluations and determination the carrying capacity in the proponent's farm as a prerequisite for resource approval. The mentioned evaluations must be undertaken by an evaluator with provincial certification. The LO also calls for the progressive monitoring of pastures and determines minimum limits of carrying capacity for approval of sheep farming activities. This represents the first time that a livestock-related Law in Argentina has included an environmental requirement. Unfortunately, the procedures and the tools necessary for use by local technicians, cooperatives, and breeders are missing, thus hindering for broad-scale application of environmental criteria.

57. There are other important baseline projects⁷ that have generated structures that will be important to the implementation of the GEF alternative. Several of these are recently completed or are near completion and will therefore not be considered as co-financing. The LO unites several ongoing development initiatives within SAGPyA. The PROLANA began in 1994, is a permanent program, and provides training and technical assistance in quality improvement and control. PROLANA is coordinated at the provincial level and their executive structure and chain of communications and contact with rural representatives will be an important asset to this program. The second program is the National Patagonian Ovine Meat Project, which works with the production, promotion, and commercialization of meat. The project develops multi-purpose breeds for both meat and wool production and improves meat breeds. For the same reasons as PROLANA the networking with breeders will be an important platform for the promotion of TME as part of the overall approach to diversification. Again, their network, extensionists, and professionals will be important multipliers for this project.

58. The Federal Program, CAMBIO RURAL, is a permanent program that began in 1993 for the purpose of preparing small and medium businesses for change and competitive and open market conditions. The program is managed by INTA in coordination with a Provincial Action Commission. The program stimulates cooperatives or clusters of rural producers and provides a qualified technician to provide technical assistance and connectivity to the group. The overall structure, the target groups, and the technicians will all be important components for project implementation and information management.

59. The PSA is another permanent project that works through a group organizational structure with the aim of market and social insertion. The project provides technical and financial assistance and training for income generation amongst small producers. Through PSA activities, producers are connected to policies, programs, and projects at the local, provincial, and national levels. The PSA structure will be important for reaching remote small producers, many of whom pay transient workers. As such, PSA will be an important counterpart and multiplier for information dissemination and groups structuring activities through their platform for amplifying agriculture production through the incorporation of technology, which will provide a conduit for

⁷ Cite UBA 2005

promoting TME. The PROINDER project is a 20-year World Bank funded initiative with only one year left to run. Although PROINDER will not form part of the financial baseline for the project, the projects structure and lessons learnt will be critical to the implementation of the GEF alternative. PROINDER has realized larger investments to the small and mid-sized producers in area management and infrastructure. The PROINDER program for Support to Rural Initiatives (AIR) is managed through Provincial Units of the PSA program. The projects association with the PSA structure and execution mechanism at the provincial level will graft into the project the expertise from the PROINDER initiative.

60. The PRODERPA is an IFAD-backed economic development initiative that will reduce poverty through environmentally sound productive activities. During the project design phase, SAGPyA representatives to IFAD who are coordinating PRODERPA activities were included to identify compatibility and actions between the two projects. The materials and norms produced for the Sheep industry and the level of trained persons will benefit the implementation of PRODERPA. The extensive structure that PRODERPA will develop to reach communities throughout Patagonia will add efficiency to the GEF alternative in addition to on-the-ground investments targeted specifically to reduce land degradation amongst the rural poor and in indigenous communities.

61. An important set of baseline activities have been provided in various administrative combinations with the provinces. The MOHAIR-(SAGPyA-PROVINCIAS-INTA) program unites small goats breeders, contemplates the better use of rangelands and the management of improved castrated goats while the PROVINO-INTA, provides genetic improvement of meat and wool and the incorporation of historic data on genetic lines into a systematized genetic database. The PROFEDER-INTA project increases competitiveness, environmental sustainability and social equity. It works through the CAMBIO RURAL, PROFAM and MINIFUNDIOS programs that provide further social capital and capacity building initiatives. Also within INTA's range of influence, is the PROHUERTA project that improves food security through gardening and nutrition. INTA's local development actions are complimented by additional initiatives to enhance competitiveness building initiatives.

62. An additional and very important set of baseline activities are the social benefit mechanisms provided by the province of Neuquén to the small and transhumant breeders through the following programs:

- Education: there is a mobile school program that accompanies the producers and their families when they migrate. In some areas additional transportation is provided to the children in addition to a school breakfast and lunch program.
- To reconcile the disperse nature of the population and the need for health care, there is a network of rural health dispensaries staffed with health workers.
- Subsidies: There are subsidies for each head sold, in addition to subsidies on propane gas, firewood, and food.
- Commercialisation: Rural Fomentation Associations are formed to assist producers with the commercialization for their products. The collective purchase of inputs and technical advice.

PART II. Strategy

Project Rationale and Policy Conformity

63. Technologies for SLM have been developed by INTA and Universities, however neither the concept of SLM nor these technologies have been sufficiently mainstreamed into governmental policies, programs or projects. Isolated efforts have been made by some provincial governments and national government but they have lacked integration, standardization and coordination. A holistic approach to SLM is needed to effectively stop the deterioration process.

64. The overall strategy was developed amongst stakeholders during a project design workshop in Bariloche. Based on the results of that exchange, the focus of the project was oriented away from the land degradation aspects associated with the petroleum and mining interests in favour of a well focused initiative that concentrates the project activities on land degradation issues common to the entire Patagonia region and on existing structures, thus reducing costs and enhancing the impact of the project.

- The project will focus on activities that will lead to broad-scale adoption of TME practices. The main menace to the structure and function of the rangelands is overgrazing and that stocking adjustment through TME practices will avoid it. Better production in quality and quantity of the modified systems will improve the financial returns and the economic sustainability of the farms and reduce poverty. Other causes of land degradation and desertification such as oil, mining, introduced species, firewood collection have less widespread impacts and will be addressed in other sustainable management programs but using the network, information exchange opportunities, and consciousness raising aspects of this program as a platform for development. Transhumant and small-scale pastoralists show special social and productive characteristics and will be attended in agreement with WISP-GEF strategy.
- The corollary strategy of the project is to coordinate representative stakeholders into a public-private non-formal network (REPAM), to create capacities and provide key information for the decision making to producers and institutions, so that the vast resources of LO and other incentives are effectively channelled to sustainable projects. The REPAM doesn't exist at present but the potential actors were identified in each province. REPAM will function as a tool within the framework of another national network, the NAP, which already includes main national agencies, both GoA and NGO`s, as well as provincial representatives. The information through this network will be delivered to sheep, goats and cattle breeders, and to other stakeholders related to rangelands degradation but not involved in livestock production.

65. The project will implement actions to ensure broad-scale application of TME in pastoral systems, complimenting actions by the LO within existing, coordinated inter-institutional framework.

66. Key strategies to enhance TME application will be:

- Build capacities of producers and their families to apply TME in their farm management through formal and informal rural education and mass media communication.
- Increment, strengthen and coordinate extension efforts through SITT.
- Develop Pilot areas to demonstrate the results of the application of TME to various levels of producers and explore a combination of conservation areas in rangelands linked to agro-tourism.
- Strengthen the capacity of producer's organizations through the consolidation of organizational and community structures, improvements to efficiency, training, and access to appropriate technologies and incentives.
- Achieve a shared sense of vision of SLM amongst numerous actors integrated into a network (REPAM)
- Build capacities of decision-makers in order to ensure that existing incentives to sheep production will be oriented to achieve TME at farm scale through training, equipment and DSS.
- Build Monitoring capacities in order to control application of incentives and to learn and replicate successful on-farm experiences, and to objectively evaluate long-term trends in range condition.
- Foment the acceptance of technologies through the creation of incentive programs, adapted to the conditions of each province and production strata.

67. The GoA is seeking GEF assistance to complement the baseline actions and nest them within a strengthened regional framework for sustainable land management (SLM) that will up-scale the lessons learnt from successful technologies and in such a manner restore ecosystem integrity, stability and functions by the lifting of barriers to sustainable land management in Patagonia and through concrete on-the-ground investments in livestock management and alternatives. Cross-cutting components include mainstreaming SLM principles into regional land-use planning and decision-making processes, through building institutional and individual capacities at the Provincial level and providing a framework and the tools needed for informed decision-making and adaptive management. Broad-based awareness building actions would also be included in cross-cutting components to increase stakeholder participation in the implementation of SLM policies and procedures to fight desertification.

68. The *status quo* is unsustainable as witnessed by the abandonment of ranches and overall reduction in stocking over the past 2 decades. Up-scaling of proper range management can revert the desertification processes in Patagonia that are reaching critical levels. If they are not, the *status quo* will continue causing reduction of primary and secondary productivity, loss of biodiversity, invasion by ligneous and/or exotic species, increased water and wind erosion, reduction of organic matter, loss of soil structure and changes in the water cycles and balances in the region. Collectively these would continue disrupting ecosystem integrity and seriously debilitating functions with consequences at the global, regional and local levels.

69. The social and economic costs of this degradation would be equally serious. In the absence of GEF intervention, the GoA will take important action to address this situation through the PDGOSP to be funded in part by the Sheep Law. This programme will naturally focus on social and economic consequences of land degradation but within a framework that does include certain elements for environment protection nor without the mechanisms for up-scaling and

broad-scale contact with multiple levels of producers to achieve global acceptance of successful technologies to revert the present situation. However, the status quo will not halt desertification processes to the extent required to restore or conserve ecosystem integrity across this vast region.

70. Under the GEF alternative scenario, baseline actions would be complemented to incorporate a broader range of environmental considerations to multiple projects and programs, including the allocation of resources to this through the Sheep Law. It would also expand the action of these baseline programmes across a larger geographical area covering a wider range of challenges and scenarios, and build institutional and individual capacities in SLM that would facilitate replication of successful experiences in the future. The result would be the implementation of a mosaic of sustainable land uses throughout Patagonia that are in line with the mosaic of environment and socio-economic conditions of this vast area. This would contribute to poverty alleviation and promote the sustainable development of the region while conserving and restoring ecosystems to their full integrity, stability and functions.

Link to the GEF operational area and the focal area.

71. Successful completion of the project outcomes will mitigate the causes and negative effects of land degradation and as a result strengthen the integrity, stability, functions and services of Patagonian arid and semi-arid ecosystems upon which local residents depend for their livelihoods, thus qualifying in the GEF OP #15. The project qualifies primarily within SLM-1 by developing policies and capacities at the federal, provincial, and local levels. The project also qualifies within SLM-2 by mainstreaming SLM into on-the-ground investments programmed through the sheep law and other projects in livestock improvement that will lead to improvements on 4,000,000 new Ha. through the implementation of TME practices on Patagonian rangeland (Please refer to Section IV Part VI PRODOC for a description of TME).

Project goal, objectives, outcomes and outputs/activities

72. The *project goal* is to contribute to the sustainable development of the Patagonia region within the context of the Argentine NAP to combat desertification. The *project objective* is to apply SLM in livestock production systems to improve the structure, integrity, and function of Patagonia's arid and semi-arid ecosystems.

Outcomes and Outputs

73. The project is composed of four outcomes. These will ensure the elimination of the barriers that impede the broad-scale implementation of TME (see threats table, Section IV: Part IV), and will be co-financed by the GEF. These components will improve the living conditions of the breeders and their families, whose current province of poverty is also a limiting factor for the implementation of SLM.

74. Outcome 1: Stakeholder and institutional capacities developed to incorporate SLM concepts into decision-making processes. (GEF contribution: \$1,437,246 USD, Co-Financing \$1,442,950 USD). This component refers to barriers: 3.1. Gaps in knowledge and information on land degradation processes, sustainable land management, SLM and DSS in decision makers at provincial level and producers. 3.2. Lack of awareness of SLM concerns and

the role in economic development planning by multiple sectors. 3.3. Low connectivity because of distances between implementing organisations. 3.4. Face to face meetings in Patagonia are cost prohibitive and 2.1.

75. In order to develop policies at the regional level, a policy debate with information and capacity building on the concepts of land degradation will be catalyzed through a consolidated Patagonian Network. Known as REPAM, this network will be developed based on negotiated agreements with public and private sector stakeholders to provide the political framework and strategy for SLM. Consistent with the LO, the network will connect existing but unconnected networks and serve as a forum for the exchange of technical information for breeders, regulators, and scientists in order to reach a broad application of TME, and begin other actions of SLM such as conservation and rehabilitation. The activities grouped in output 1.1 include facilitation of discussion through forums with main stakeholders, preparation in order to reach a broad application of TME, and begin other actions of SLM such as conservation and rehabilitation. The activities grouped in output 1.1 include Facilitation of discussion through forums with main stakeholders, preparation of a common document on SLM, web page and electronic forum with a data base and information centre.

76. In order to provide the tools needed, the project will assist in the completion of a Decision Support System (DSS). This DSS will provide decision makers involved in the project (SAGPyA, SAyDS, Provincial governments, INTA, NGOs and Breeder Associations) with up-to-date information regarding sustainable land use management, policy design, programs, projects, credit, incentives, etc., and will promote up-streaming of SLM in the decision making process. This DSS will include a *GIS*, *simulation models*, a *range monitoring system* and an *early warning system*. The *GIS* component is defined as an information system that is used to input, store, retrieve, manipulate, analyze and output geographically referenced data or geospatial data, in order to support decision making for planning and management of land use, natural resources and environment. It will be a key element for organizing information at the provincial and ranch level in Patagonia. Thematic maps of natural resources, provincial satellite mosaics, cadastral maps, politic division, cities, towns, roads, hydrographic basins, eco regions, climate, vegetation, soils, geology, geo morphology, protected areas, desertification, socio economic, livestock production and stocking rates will be elaborated. Information at ranch level will facilitate breeder and expert participation in the decision making process.

77. A database will be designed that will centralize existing information related to animal husbandry and range evaluation as well as the information that is generated during the project. It will include size of the ranch, information on the breeder and his family, number and structure of flocks, weaning percentage, wool and meat production, average stocking rate (sheep, goat, cattle and horses), carrying capacity and range evaluation data. A series of computer *simulation models* of livestock production and the ecosystem for rangelands in Patagonia will be elaborated for large, medium and small breeders. These are multidisciplinary models that will involve both experimental work in the field and computer modeling. Recent results from rangeland modeling have indicated the important influence of livestock (sheep, goat, cattle and horses) on the stability and sustainability of rangeland systems. Consequently rangeland models depend on accurate representation of the performance of livestock and their impact on the vegetation and on the productivity of the whole system. A *monitoring system* for Patagonian rangelands will be produced at farm and regional scales. At the Farm Scale, range evaluations concentrate in yearly variations of forage that allow for adaptive management. These rangeland evaluations will be

mandatory for all LO credits and with GEF initiative will also be mainstreamed in all the provincial and national incentives.

78. The strategy of GEF project will be to unify the protocols of the range evaluation requirements, collect and introduce this data in a GIS data base of the SSD, and provide feedback to LO and other provincial or national decision makers in order to adjust decisions based on on-the-ground results. At the regional scale a different system for the evaluation of early indicators of rangeland condition will be developed. The MARA system (Oliva et al. 2004a) of Patagonia backed by a NAP program and LADA (FAO), was developed to monitor ecologic units with ground monitors at a density of approximately 1 per 20.000 ha, that matches the size of cadastral units. A central web data base will be designed with GEF funding to validate the entries using a single species and indicators list for the entire region and connect the points in the GIS layer. Evaluations will be performed by trained and registered private consultants or by government personnel and paid for initially by GEF and subsequently by the provinces. The number of monitors will be carefully assessed in order to assure fewer repeated measures instead of a high number of single observations based on WARMS experience (initially, about 600 monitors established at a rate of 120 per year are planned). The sites will be revisited every five years. Although few data will be available at the end of the project, the network of monitors will allow for the first objective evaluations of trends of rangelands in the future.

79. An *early warning system* will provide information on pasture conditions, droughts, snowfalls, and fires. This information will be generated from satellite data, meteorological models and production models and will be disseminated by means of bulletins, web pages and mass media. In addition, experts will be able to communicate changes in trends to stakeholders at all levels, including participation by breeders. INTA and consultants from the meteorological service will provide meteorological warnings, and a network of meteorological stations throughout the region will be strengthened with INTA resources with GEF co-financing. These stations are required because of the very sparse and incomplete meteorological station network in Patagonia. This DSS would be designed to build on existing capacities in the region, to be fully financially sustainable by the end of the project, and to provide a dynamic tool to be adapted for use by different scales and by different users. It will store the animal production and rangeland evaluation data collected in the execution of LO projects, at the ranch level, and will also store long term data from ground monitoring points linked to the indicators from the FAO/LADA project. The DSS will provide decision makers of LO and other agencies related to natural resource management with information required to ensure that incentives reach farms applying TME management. Monitoring systems will provide an objective evaluation of results in the long-term. Early warnings of drought and snowstorms that will enable decision making on early supplementation and stock reduction and on establishment of reserves, thereby reducing production uncertainty, a key limitation of rangeland production that is expected to be aggravated in relation to global climate change.

80. Training and equipment will be provided to enable the provincial level institutions to apply the DSS through Output 1.3. An Institutional Capacity Deficit survey that was conducted as part of the PDF-B activities will guide on the main requirements. In addition, legal advice will be provided to streamline regulations and institutional structures.

81. Outcome 2 *Local level producers have increased capacities to apply SLM in different ecosystems and livestock production systems (GEF contribution:\$ 2,374,800 USD USD, Co-Financing: \$6,777,212 USD)*. This component refers to barriers: 1.1 Social capital limitations among large, medium and small producers and their families limit information exchange and consciousness raising. 1.2. Institutional constraints and limited human resource capability limits information and exchange capacity of federal and provincial government extension services, to channel information and resources available for TME 1.3. Restricted participation in programs, access to subsidies and credits and information exchange by small producers due to land property certification requirements. 1.4. Limited local TME experiences demonstrated and validated in representative ecosystems and real production.

82. Small farmers remain dispersed and under-represented in the lobby for pastoralist concerns. This output will support co-financed initiatives by PSA and/or by PRODERPA in developing the social structure that will enable an effective lobby and facilitate access to programs, incentives and information. The creation of associations of producers will help to overcome the farm-size barriers, such as small herd size, to TME adoption. Associations specifically related to sheep rearing would be funded mainly through LO and complemented by GEF resources to include associations for trading products from alternative land-uses. Particular attention would be given to ensure the participation of women, youth and indigenous groups in these associations. GEF financed activities would include capacity assessments and training for leaders and promoters (output 2.1). To facilitate the flow of information downstream, the project would work to improve the capacities of extensionists within an integrated participatory extension and technology transfer system (SITT) to provide assistance to farmers. GEF funded activities in this output (2.2) will be the facilitation of the design of the integrated transference system, equipment for extension activities, including vehicles, computers and communication facilities and operative costs of the extension efforts. These activities will benefit from (and contribute to) guidance and advocacy generated by WISP (World Initiative for Sustainable Pastoralism).

83. Farmers from across the region would be trained in the adoption of TME and the evaluation of pastures required for accessing the resources through the Ovine Law (output 2.3). This training, to be made available largely through LO, would be complemented by GEF.

84. Complimentary to farmer training, rural families will increase their knowledge and awareness of the land degradation problems and SLM practices within the context of the public school system in order to encourage changes in traditional production systems and ways of life. Within the formal education strategy (Output 2.4), primary and secondary school children will be motivated through the formal educational system to develop the intellectual and social conditions that enable the discussion of SLM. Specifically, the strategy calls for the inclusion of the theme of desertification in the school agenda. This will draw upon the current dialogue in the UNCCD on Sustainable Rangelands. Local examples and the inclusion of Patagonia's natural resources (rangelands, wetlands, wood and shrub lands) and regional modes of production will be introduced as examples of interaction between production and the environment. The elaboration and distribution of multimedia materials adapted to each of the educational levels of regional schools, the development of a didactic strategy and educational materials, and the realization of student forums in all the regional schools as a result of the educational activities and the extension efforts of the project, including science fairs and contests are examples of activities that could be included in the annual work plan. Non – formal education will be generated through Mass media materials (TV, radio, newspapers) on desertification and SLM. The

Patagonia Network would support these activities through a web site and virtual campus. Specific actions will be designed to help in the inclusion of young people of both genders in the productive systems, and to focus in the problems of native populations and adult women in relation to degradation of land and rural life.

85. Sheep farming activities funded through the Sheep Law would be complemented with GEF funding in demonstration or model projects(output 2.5). TME has been applied in 500 farms and 2 M ha across different farm strata and ecological areas in Patagonia. Pilot projects are therefore not necessary to validate the techniques and the overall technology in the field. The 12 demonstrative projects are planned as an extension strategy and will facilitate the adoption of TME by producers and enable the understanding of TME in eco-regions where the technology is not validated. Interested producers will be identified and projects evaluated by the staff of Sheep Law's Provincial Executing Unit, extension officers and researchers. Selected areas will go through rangeland evaluations and production plans will be prepared. They will be analyzed in a participatory way with breeders in order to assure that they attain optimal animal production levels compatible with natural resource conservation. The Sheep Law will fund the productive investments, through its special financial instruments. The GEF increment will finance forage evaluations and planning of grazing, annual monitoring of vegetation, forage and animal production and small scale production infrastructure (such as electric fences, shelters, etc) needed in small subsistence farms. It will also finance field days that will demonstrate TME practices with permit participatory evaluation of the results. In areas that could have higher carrying capacity potential but that have suffered particularly high levels of land degradation, some pilot projects may include the testing of different forms of rehabilitation to enable previous unproductive land to be restored for other uses. This may include dune fixation and stabilization of gullies in places where these practices are not profitable from a purely livestock business viewpoint.

86. On-the-ground models for conservation within private lands will be validated through a regional survey of potential conservation sites (wetlands, areas with high number of endemic species, etc) on rangelands in each of the main ecological areas of Patagonia. This product is funded through output 2.6. A survey will be performed based on satellite imagery, published literature and expert advice. Workshops will be held with producers in these areas in order to transmit the values detected, and to consult on possible conservation initiatives. Field inventories of conservation values will be performed in selected sites and conservation problems in relation to range management discussed with the producers. Areas with conservation potential apart from grazing or with special management potential will be established. The legal framework in each of the Provinces will be analyzed through legal consultants, in order to register them as protected areas. Fiscal and economic incentives of provincial and national sources (rural custodies) will be looked for. Brochures and other agro-tourism-oriented materials will be produced.

87. Outcome 3. Livestock promotion and incentive programs and on-the-ground investments mainstream SLM in livestock pasture management and conservation alternative employment (GEF contribution: \$443,470 USD, Co-Financing: \$18,021,294 USD) This component responds to barriers: 1.1 Social capital limitations among large, medium and small producers and their families limit information exchange and consciousness raising. 2.4. Gaps in access to resources available for large, medium and small scale producers seeking establishment of conservation reserves on private lands. 2.5. Lack of normative actions, policies, criteria, and instruments that enable incentives for SLM and differentiated product protocols to be established at the provincial level and 3.5. Missing policies, criteria, and instruments at the provincial and agency level that mainstream SLM into Federal and Provincial sector support programs.

88. This output will complement the LO by providing tools for local technicians and managers to continue to invest in productivity of the pastoral systems without accelerating land degradation. The GEF alternative is to mainstream TME into the planning and approval process of the principal sector development plans and projects by developing criteria and norms for the institutions that implement these programs (output 3.1, consultants) and by developing tools, materials, and training (output 3.2), as guidelines for field technicians and decision-makers. With both norms and tools, implementing institutions would require sound management based in TME before qualifying for credits, subsidies, or incentives. First, the project will sign agreements with the implementing SAGPyA and all sheep law implementing authorities. Later, all provincial level rural development projects, such as Cambio Rural, and PRODERPA would eventually be included within the context of their implementation agreements so that the assignment of the planned resources for productive development includes: 1) TME in the planning process, 2) in guidelines and investment criteria, 3) and in the investment approval process (output 3.1). Once the agreements are reached, the technical teams, promoters, and agents of each institution will be strengthened to implement TME within the context of their institutions and investments (output 3.1) This will be achieved through the publication of guidelines, criteria, and technical training (output 3.2). The GEF will cover the direct costs of mainstreaming the SLM and TME technology into the institutions while the mentioned institutions will provide the costs of the poverty reduction and sector specific on-the ground investments. Technicians assigned to cooperatives and federations would also be trained to undertake comprehensive assessments of requests for resources through the LO, ensuring these comply with TME principles. This would expedite these processes enabling the full use of available resources.

89. Additional revenues must be generated to assure a continued source of investment once the sheep law has expired. Potential reward systems are: certificates for TME implementers, prizes for model breeders, and recognition for federations with the most certified ranchers. The scope of the awards and incentives will be elected upon completion of the first annual work plan. These incentive systems will include tax incentives, subsidies, and promotional interest rates and will be developed according to the characteristics of each province and linked to performance in the implementation of TME. The GEF alternative will include the information, technical assistance, and lobby to establish the tax incentives.

90. Outcome 4: Learning, and dissemination principles contribute to guide SLM in arid and semi-ecosystems and enable project adaptive management in Patagonia (GEF: \$928,450 USD, Co-Financing \$329,000 USD).

91. Effective project and adaptive management will ensure effective project implementation and better results. Workshops at the national level and the integration of project and agency staff and local leaders from the various provincial rural development committees and the structure of the Patagonian Network (output 1.1) will facilitate the dissemination and exchange of lessons learnt within the Patagonia region and at the national level. The participatory evaluation process, as part of the development of model projects and the technology transfer process (output 2.2 and 2.5), will also contribute the sharing of lessons learnt at the rural level. Through adaptive

management and execution of the scheduled monitoring and evaluation plan and disseminating lessons (Output 4.3), the results of the project should influence other initiatives in Argentina through the implementing partners and improve the adaptive management of the project. Argentina will disseminate project related information to pastoralists at the international level through the GEF funded WISP project (see Replication).

Project indicators, risks and assumptions

92. There are 3 key indicators needed to measure success at the objective level. The broad indicator of interest to INTA and SAGPyA is the number of hectares under sustainable management. There is an estimated 2,000,000 Ha. with TME management. Sustainable management is understood to be “under TME processes” as described in Section IV Part VI. An indicator relating to cover was added to focus of the need for physical results at the landscape level that would lead to the mentioned indirect benefits. An increase in lands under TME without an increase in pasture condition would indicate that outputs are being realized but without the impacts that would lead to the mentioned benefits. An increase in cover is essential to the local environmental benefits expected from an expansion in TME. INTA’s technical staff expects to see a 20% increase in cover as measured in the demonstration projects, which would indicate the expected broad effects. An additional and very important indicator is the weaning percentage. Weaning percentage provides a qualitative measure of the condition of the pastures. The reproductive success of the livestock population is correlated to the quality and health of the range, which is linked with ecosystem services that are the product of ecosystem functions. Investigations in TME technology have demonstrated that when all factors improve, the weaning percentage must increase.

93. Capacity building is expressed at the outcome level for *outcome 1* and in the majority of the outputs under outcomes 2 and 3. To measure capacity, a Capacity Deficit Index, or DCI for its Spanish language acronym, is calculated. The DCI is measured through surveys of practical elements that comprise a particular capacity related to the outcome or output. For example, to measure the ability of a rural cooperative to facilitate its members on programs and practices, the survey derives elements for receiving on-time information, ability to manage the technical aspects of the programs, and the ability to communicate the contents of the programs to the members. A DCI index above 5 indicates capacity deficits. As the DCI ranking reduces, the more capable the measured population. An overall DCI assessment was done for the entire project with 120 elements of broad capacities being evaluated. As the logical framework was developed, the UPP has combined the most pertinent elements to derive a preliminary DCI index for capacity related outputs and for Outcome 1. Since the logical framework was based on a participatory process, it was not possible to predict exactly what the final logical framework would look like. For that reason, a universe of common capacity elements was selected. This type of sample was necessary during the PDF-B phase to mitigate the considerable cost of data collection in across Patagonia’s enormous territory. A DCI measurement will be an important indicator for Outcome 1 and for output 1.3 and 2.1, which deals with the capacity to implement SLM.

94. *Outcome 2* develops social capital and interfaces it with the systems created in *outcome 1*, such as the network, decision support system, and technology transfer system. Therefore, the

outputs for outcome 2 require 2 indicators each: one that indicates the development of the target social structure and a second that measures capacity to manage the mentioned systems or programs. For these areas, more precise DCI analyses will be necessary at the start-up phase of the project for the hard-to-reach groups such as the cooperatives of small producers.

95. *Outcome 3* deals with mainstreaming SLM into on-the-ground investments. The indicators of mainstreaming will be the policies adopted and internalized by the participating institutions on one hand and the implementation of the tools used by staff members to actually check environmental aspects as part of the approval process for credits, loans, or subsidies through the sheep law or one of the multi-lateral projects.

96. *Outcome 4* assures adequate project management, monitoring and evaluation, and dissemination and response to feedback. The indicators of success will be the successful execution of the annual work plans and budget, completion of the monitoring and evaluation plan, and finally, incorporation of the recommendations from mid-term and final evaluations. As this outcome will be managed by the project staff, there are no foreseeable assumptions or risks.

97. There is no significant and foreseeable risk to the project if the pertinent assumptions should bear true. At the objective level, many of the elements of the GEF alternative are geared to reduce risk to the livestock producers. These same elements, such as early warning systems and pasture reserves, will enable the farmer to manipulate flock size and strategically change the position of the herds with enough lead time to reduce losses due to extreme weather (see TME summary, Section IV, Part VI). The key *assumption* made is that the climate will remain within predictable levels given the level of INTA's technology. The capacity level of agencies and personnel in cooperatives at the grass roots level in Argentina is relatively high in terms of basic abilities, implying a lower risk that personnel of agencies and cooperatives will not respond to training and capacity building activities. The risk is further minimized throughout the implementation of DCI tools to determine the types of deficiencies that exist. There is also a low risk to the possibility that staff persons could change with political changes in the provincial governments due to a more solidified civil service system. There is very little risk to the project based on the assumption that political changes could change the commitment of the government to the project. The sheep law is, in fact, a law and will run its life with little foreseeable chance of being repealed.

98. At the outcome level, the logical framework assumes that Argentina's economic outlook will remain within predictable levels. The project relies on the commitment of the government counterpart agencies to assign personnel to the extension system and leave them long enough to acquire the skills needed to facilitate the producers. The co-financing letters will specify this level of commitment. The project also assumes that the producers will pay-off their credits to a fiduciary fund and that the fund will disburse as planned. At the present time and under the present economic conditions, it appears that the government programs are being reimbursed on schedule with money recovered from on-the-ground investments. FRAO and the revolving fund are functioning as planned. Finally, at the objective level Argentine inflation and market factors must remain within a predictable range of 10-15% for the returns on the demonstration projects to remain within an attractive level. Investments in TME have demonstrated an 18-33% return. The given economy does not lend itself to those fears and TMEs returns appear

Table 3: Risk analysis

Risk	Risk Rating*	Risk Mitigation Measure
National and provincial governments maintain their support to project implementation.	L	Creation and operation of the REPAM would provide a context in which to discuss programs and projects, training and updates, helping to maintain national and provincial government interest in and support for the project. The revolving fund structure reinvests funds at the provincial level, sheltering the functionality of the fund from political change. The covenants and agreements signed by the institutions provide the framework and ensure their commitment regarding assignment of personnel to work on SLM. Training technicians of different institutions and having them participate in new projects will achieve greater integration and the results will serve as an incentive for the institutions to retain these technicians. A balance of support amongst different stakeholders reduces risk.
Long-range commitment of associates is maintained.	L	
The institutions assign personnel, and allow them to acquire new skills within SLM planning .	L	
Qualified technicians are retained by their institutions in the mid-term.	L	
Government and producers commit to an extension and technology transfer system continues in the long-term.	L	Reaching a consensus among provincial government, producers and INTA on the design of a SITT, plus training both technicians and producers, will ensure greater long-term commitment.
Commitment of provincial governments through changes in administration.	M	Signing framework agreements with the provincial governments and agreements for joint projects will ensure continued commitment, even if there are changes in administration.
Overall Risk Rating	L	

*Risk rating – H (High Risk), S (Substantial Risk), M (Modest Risk), and L (Low Risk). Risks refer to the possibility that assumptions, defined in the logical framework in Part 3, may not hold.

Expected global, national and local benefits

99. Expected benefits will be realized at the global, national, and local levels. At the global level, the project will result in improved ecosystem resilience and productivity in one of the world’s most important dryland ecosystems. The project will establish environmental criteria and tools that will contribute to the generation of additional indirect global benefits to derived from on-the-ground investments in pastoral systems. Additional structures, such as the Patagonian Network and social capital investments and a technology transfer system will facilitate the up-scaling of the Extensive Management Technology (TME) from 2M Ha. to 6 M Ha. that will result in favourable local environmental impacts in the form of increased cover (and decreased reduction in cover) of a more biologically diverse steppe and grassland ecosystems protecting to a degree the diversity of the dryland ecosystem. Increase in cover implies secondary global benefits with subsequent reduction in soil desiccation to wind with corresponding increases in soil organic matter, nutrient recycling, and moisture that will lead to increased carbon storage and absorption. Other indirect global benefits will be the promotion of a spatially and structurally diverse landscape containing a large number of native perennials (for example the conservation of wetland meadow among steppe). This will result also result in secondary biodiversity benefits through the improvement of habitat conditions for endemic and migratory species. However, given the specific focus of this project on SLM, these benefits will

not be measured as indicators of project success. In the model projects, the amount of actual carbon capture will be determined for areas applying TME as described in Section IV, Part VI. At the present time, a capture of 51.6 M tonnes⁸ is projected with reductions of soil loss of up to 8.6 tonnes/Ha. (See analysis in Section IV, Part III). A reduction in intensive grazing will lead to stabilization of land use patterns and a 15-30% higher return on investment will alleviate somewhat the pressures on the remaining natural vegetation within the steppe and “malline” ecosystems by reducing the point intensive effects associated with intensive grazing patterns.

100. Nationally, the mainstreaming of SLM concerns (land functionality analysis, impact assessment) into the programs financed by the sheep law will help extend sheep law programs through the improved structures, thus enhancing the delivery capacity of the sheep law programs. The social capital investments will enable the provinces to execute their budgets for sheep law programs, assuring greater resources for SLM within the region and the delivery of more investments in productive activities that will alleviate poverty. The up-scaling of TME, and the sharing of information and lessons learnt from 8 important projects will provide Argentina with an example of how to link federal agencies with provincial agencies, politicians, and the private sector, to establish a forum for information, policy debate, and lobby within the context of sustainable land management. Although the system boundary of this project is limited to the pastoral aspects of Patagonian land use, the Patagonian Network will also provide the structure and a forum for creating communication amongst stakeholders for other important land degradation issues within Patagonia, such as mining, oil and gas exploration, and themes such as land reclamation.

101. The capacity building processes will enable better policy decisions by providing lawmakers with models, more informed staff members, and a forum for contact with sector interests and lobbies for large, medium, and small producers. Application of those tools add missing technical elements to the decision-making process and will enable early warning to even the smallest producers allowing them to take steps to reduce losses when confronted with climatic events, providing yet further opportunity for poverty reduction. The major sector projects and their technicians will benefit from the development of mainstreamed environmental protocols and tools which will lead to cost sharing and the coordination of sector based information rather than project based information. The exchange of information and technologies also benefits the producers by giving them the tools to effectively lobby for pastoralist concerns. The establishment of incentives by provincial governments will generate an important experience in planning and sustainable financing for sustainable land management.

102. At the local level, breeders will enjoy increased access to the tools and credit necessary to improve their livelihoods and preserve the natural capital on which their herds and livelihoods depend. They will also receive direct economic and social benefits through improvements in the social infrastructure and better connectivity to programs and projects. Increases in the capacity of the local organization will improve the access by those who, as individuals, would otherwise not qualify for livestock development programs.. Local experts will have better access to programs and projects for which their local populations qualify. Information and results from

⁸ Note that the estimates are being calculated by INTA at this time.

on-the-ground models/demonstrations will provide locally validated information for extension services and information on the economies of alternative modes of production, all of which will help the producer in the long term and contribute to poverty reduction. In addition, local teachers and students across Patagonia will have better access to information for use in lessons and access to materials.

103. **Environmental Impact on Land degradation:** Modifications suffered by communities under poor range management that leads to overgrazing are varied (Paruelo et al. 1993) but generally are centred in the replacement of grasses by shrubs of less palatability and the soil loss of thin particles (limes) because of erosion, that reduces an important part of organic matter and nutrients (Oliva et al. 2000). Degraded pastures also loose their patch structure that determines a network of nutrient sinks and drains. These factors collectively lead to:

- **Reduction in ecosystem function:** (i) loss of CO₂ capture and storage estimated at 8.6 tonnes/Ha. (see Section IV, Part III); (ii) Reduced water availability in meadows “mallines” (iii) Soil nutrient and organic matter loss.
- **Loss of ecosystem resiliency:** (i) reduced resistance to wind and water erosion, (ii) irreversible transitions in rangeland leading to soil loss, dune and desert pavement formation.(iii) Vulnerability to effects of climate change.
- **Reduction in ecosystem services:** (i) decline in quality and quantity of water produced in rangelands for human and livestock use. (ii) loss of forage biomass and increase of unpalatable species (iii) loss of habitat to shelter livestock and biodiversity, (iv) increase in animal production variability and susceptibility to climatic events.

Country Ownership: Country Eligibility and Country Drivenness

104. Argentina subscribed to the UN Convention to Combat Desertification in 1994, ratifying it in 1996 by the Law 24.701. *‘The conformity with the UNCCD has been verified by the focal point, which has both endorsed the project and has participated as a member of the UPP throughout the design phase. The project specifically relates to Article 3 of the UNCCD relating to net changes in Greenhouse gas emissions by removal of sinks resulting from direct human-induced land-use change. The project will work with the UNCCD focal point so that all stakeholders are cognizant of the link between the project and the convention, including more recent perspectives from COP6 (Havana, 2003) and CRIC3 (Bonn, 2005).’* [Indeed in terms of the latter the project clearly follows the CRIC-3 report recommendation for projects to support adaptive management among pastoralists.](#)

105. The project has also been endorsed by the National Director of International Cooperation from the Ministry of Foreign Affairs, International Commerce and Worship, as GEF focal point, and the Assessor to the Minister for Health and Environment by the Secretary for Environment and Sustainable Development as CCD focal point (see endorsement letters in Section IV Part I). In addition, Argentina is signatory of the following pertinent international conventions:

- United Nations Framework Convention on Climate Change (signed 9 May 1992, and ratified on 7 December 1993).
- Kyoto Protocol to the UNCCD (ratified on 11 December, 1997).
- Convention on Biological Diversity (signed 13 June 1992, ratified 20 November 1995).

Relationship to National Plans and Priorities

106. A National Action Plan (NAP) was developed through a participative process that ended in 1998 with two workshops in Patagonia. This last region plays a fundamental role in NAP since it represents most of the arid lands in the country.

107. The project is consistent with the NAP in the following strategic areas:

- Establishment of a national network for the fight against desertification
- Establishment of a National Desertification Monitoring and Evaluation System
- Public consciousness raising, education, and training
- Strengthening of institutional and legal frameworks
- Strengthening of economic and financial frameworks
- Insertion of the National Programme into regional and international frameworks.

108. By developing the regional capacities for SLM, the proposed project clearly complies with the NAP's first line of strategic action since it will have components that deal with the institutional and financial enforcement and the information systems for SLM, as well as others to create awareness among stakeholders about inherent issues on Desertification. The proposed project will also contribute in a direct way in four of the remaining strategic lines of action of NAP (see Relationship to national priorities). The project responds to the objectives of the NAP by creating tools, information, and processes that will be beneficial to the overall implementation of the NAP, since the Patagonia shelters a livestock pasture eco-region considered priority at World level for biodiversity conservancy, the Project will also contribute to the regional and global action in that field.

109. The project responds to the objectives of the NAP by creating tools, information, and processes that will be beneficial to the overall implementation of the NAP. The target area of the project, Patagonia, played a pivotal role in the formation of the NAP, housing two of the regional seminars and providing key inputs to the definition of problems and solutions. Patagonia drylands represent 50% of the national total and 23% of the national land territory for land area under some degree of desertification processes. The project complies with the five of six strategic lines of the NAP by addressing the major causes of land degradation and building regional capacities for SLM and by addressing institutional and financial frameworks and information systems for SLM, as well as raising awareness in a range of stakeholders on desertification issues.

110. GEF actions will complement the Sustainable Sheep Husbandry Development Programme for Patagonia (PDGOSP) that seeks to improve living conditions of rural populations through increasing profitability of sheep farming using sustainable practices that help combat the

desertification processes. The programme is made operational through Law 22,428, known as the Sheep Law. The GEF alternative will complement the PDGOSP by providing frameworks for upstream and downstream communication between lawmakers, technicians, and breeders, provide institutional and local capacity building, information exchange and decision support mechanisms, and environmental tools and mechanisms for on-the-ground investments funded through the Sheep Law. The GEF project will work within an established framework based on a joint agreement between SAGPyA and SAyDS that maximizes contributions to combating desertification, thus supporting Argentina's move to create synergies at the institutional level. In addition, the project will create a network and information that may be shared and provide support to 8 other region-wide and sector specific development projects sponsored by the Argentine government and initiatives with IFAD and FAO support (see baseline analysis). The implementation of the project will utilize many of the delivery systems by those projects for implementation of activities. As such it is fully concordant with sector plans for the region.

111. By addressing the main cause of desertification in a region recognized as one of the world's main drylands, and removing barriers to the implementation of SLM, the project will also contribute to the goals of the UNCCD. As Patagonia houses a grassland eco-region flagged as a global priority for biodiversity conservation, it will also contribute to regional and global action in this arena.

112. The project supports the UNDP Strategic Resource Framework (SRF) "Energy and environment for sustainable development" goal, in addition to an important national outcome for the period 2005/2008: "national policies and projects on key environmental issues as desertification mitigation designed and implemented (one project formulated and implementation initiated in Patagonia)". The project supports the UNDP Country Program Outline (CPO), incorporating sustainable management of environment and natural resources in national development policies and sector strategies, and promoting actions oriented to combat desertification and avoid soil degradation. The project supports the Millennium Development goal #8, to assure a sustainable environment, and goal #14, "to achieve by 2015 that all of the politics and programs of the country have integrated the principles of sustainable development and that have reversed the trend of loss of natural resources," which is consistent with SAyDS' strategy to mainstream environment in to different political sectors.

Sustainability

113. The project components are designed to achieve SLM and catalyze the sustainability of the initiative within the political, institutional, social, financial, and environmental realms.

114. The **Political/Institutional Sustainability** of the project will come from two key interventions. The first is the establishment of a public-private participation forum. The proposed Patagonia network (output 1.1) unites both public and private concerns and provides a virtual centre for sharing tools and for discussing the future agenda of Patagonia and the livestock sector. The tools, capacities, and interactive framework created will facilitate the sharing of information from many projects and provincial and local governments, thereby making other initiatives, such as the Sheep Law, and projects such as PRO-LANA more sustainable. The second perspective is the active involvement of the political institutions in the

project. The involvement and sharing of information, partly due to the network and in part due to the inclusion of the public sector, particularly the Patagonian Parliament, in the PDF-B development process and in the approval of the project design (see stakeholder participation para. 45-50) will facilitate the long-term acceptance across the 6 Patagonian provinces. The involvement of provincial officials in the project steering committee will also greatly facilitate project continuity in the event that one or more of the provinces changes representatives to the committee following elections. Finally, political sustainability is fostered by the strategy to utilize and empower the existing political and social structures. The mentioned network, for example, will seek to connect additional nodes, such as the producer's federations, who have access to large groups of members and that are, in themselves, politically significant organizations within the local power structure. Their acceptance of the project will be developed through open and active participation in the project decision-making structure.

115. For breeders of all sizes and situations, the network becomes a lobby and an opportunity to express their points of view in a forum that is likely to reach the eyes and ears of lawmakers and decision makers. That process began with the presentations given to the Patagonian Parliament and will continue throughout the project.

116. The **Social sustainability** of the GEF alternative will invest in social capital among the more individualistic, small scale breeders that do not have an effective social structure. These investments will be co-financed by the PRODERPA project (IFAD). The PRODERPA project will use the same project steering mechanism, the CDR, as other important projects, such as CAMBIO RURAL. The GEF increment will provide the baseline analysis of the capacity of the grassroots organizations while the alternative will provide investment in social capital. The sustainability factor is vested in the ability of the local organizations to successfully promote TME technology and, as a result, qualify for tax credits, subsidies, or loans based on verification of the application of the technology. Giving local associations and cooperatives a role in the process will legitimize them as a forum beneficial to their members and solidify their position as facilitators. The cooperatives and their nexus with the Patagonian network will create access to the network, creating an opportunity for local organizations to become a forum for lobby on the behalf of their members, further legitimizing them as organizations. A final step towards social sustainability is the GEF evaluation process. The mid and final evaluations will provide valuable information on the social sustainability of the partner programs as well, such as Cambio Rural or the Sheep Law. The lessons learnt from those evaluations will be analyzed by managers of multiple projects and by stakeholders.

117. The **Financial Sustainability** of the Sheep Law provides for the creation of revolving funds from credit repayments from producers. There have been several experiences of revolving funds. The SAyDS has synthesized experiences from PRODESAR, NAP, PSA, PROINDER, PROSUB, LO and different NGOs around the country. This has proved to be an effective approach to help small farmers to incorporate appropriate technology. The rate of repayment of credits has been over 80% in all cases, a rate never achieved by bigger breeders or even other sectors like intensive agriculture or industry. Based on a model from Rio Negro, tax-based incentives to facilitate the replication of the TME technology to all breeders will be explored. Once the Sheep Law funds are exhausted, it will be important for the provinces to take the lead in managing the land base within their territories. Incentives that recognize voluntary adoption

of the TME standards are an important tool to stimulate voluntary adoption of the technology. At present, producers that comply with a sustainable management in their establishments can be rewarded with credits from the Sheep Law, real estate tax exemptions, net income tax effects, taxes on sales stamps and inheritance taxes. Application of TME technology at the ranch level is verified by the Sheep Law representatives who send a declaration to tax authorities.

118. Based on a model from Rio Negro, tax-based incentives to facilitate the replication of the TME technology to all breeders will be explored. Once the Sheep Law funds are exhausted, it will be important for provinces to take the lead in managing the land base within their territories. Incentives that recognize voluntary adoption of the TME standards are an important tool to stimulate voluntary adoption of the technology. At present, producers that comply with a sustainable management in their establishments can be rewarded with credits from the Sheep Law, real province tax exemptions, net income tax effects, taxes on sales stamps and inheritance taxes. Application of TME technology at the ranch level is verified by the Ovine Law representatives who send a declaration to tax authorities. The Province of Neuquén has developed a special kind of incentives applied to small goat and sheep breeders that alleviates overstocking in small ranches amongst a total of 5.000 breeders. These are policy subsidies directed towards the sale of animals. The subsidies differ according to the animal category, and in 2004 were distributed an amount of U\$ 2.758.000.

119. Approximately 80% (of \$6.9M USD annually) of Sheep Law funds are delivered in the form of credits, which are recovered and re-deposited in the Sheep Activity Recuperation Fund (FRAO). Patagonia accounts for 67% of the annual investment (\$4.62M USD) with an estimated recovery period of 7 years on the value of the product produced. Oversight to the fund is charged to the Technical Assessment Commission of the Sheep Law (CAT) and implemented through the UEP in each province, [to which the UPP of the GEF project will be a member](#). [The funds provided by the fiduciary mechanism of the Sheep Law will](#) operate for a 15-year period. Recovered funds will be managed by the Provinces through SAGPyA. Recovered funds will be redistributed to the provinces on a “use-it” basis, in addition to new annual disbursements. For example, a province receives \$2,000,000 in new funds plus \$100,000 in funds recovered from credits. If they redistribute the full amount to producers, they qualify for their full disbursement in the following year. If not, the undistributed amount is allocated to all provinces equally. [Although UNDP or the UPP is not technically involved in the management of the funds, the presence of the UPP on the UEP will add technical assistance and permit application of the decision-making tools to be developed by the project directly within the provincial-level decision-making framework](#). The network and investments in social capital will assist the provinces to execute in a more efficient way their yearly disbursements, and will potentially qualify for future disbursements. To date, the fund is just beginning to recover the first credits from 2004 amounting to an estimated recovery of \$690,000 USD. [The UPP will also monitor the reinvestment scenario for the funds as part of the sustainability mechanism of the project](#).

120. The **Environmental Sustainability** will be generated through the mechanisms to promote and sustainably finance TME at the provincial level. The *status quo* is not environmentally sustainable (see baseline analysis). Environmental sustainability will be fostered by a long-term framework for the adoption of Extensive Management Technology (TME). The political, social, and financial sustainability of the initiative will influence the project objective, which is the

environmentally sound condition. Implementation of the work plan will create a framework for SLM, while the incentives will positively influence the cultural change at the landscape level. (see Section IV, Part VI). Environmentally deteriorating systems and practices will be substituted by sustainable management systems and practices that protect natural resources. The alternatives to management will test solutions that will enhance biodiversity and the restoration of soil fertility. Proper management of *mallines* will foster an increase in water resources and wildlife, and overall, there will be a political and technical initiative towards the development of steppe, wetland meadows, and scrub forest ecosystems and with it the associated environmental benefits. (see Section IV, Part VII). Adoption of the SLM concept within the agendas of politicians, technicians and producers agendas will assure, in the mid and long term, the environmental sustainability through an appropriate land management.

121. The aspects of TME that enhance sustainability are: (1) Ecosystem function and structure are preserved because overgrazing is avoided. Stocking rates based on objective rangeland forage evaluations prevent negative transitions in vegetation and soil structure, maintain rangeland bio biodiversity, and allow regeneration of grass populations. (2) There is strong evidence that adjusted stocking rates allow rangelands to maintain primary production capacity in the long term. (3) Profitability is improved because proper forage allocation and paddock distribution of the animals ensures optimal individual animal performance, reduces dependence on climatic variation and ensures a better quality of wool and lambs. Net production of the grazing system is optimized using a number of practices such as pre-lambing shearing with special techniques, wool classification, adjustment of flock structure, reproductive management (number and type of rams, lambing shelters and strategic forage supplementation), genetic improvement, sanitary control, predator control, and winter feeding. On areas with a high proportion of wetlands and enough paddocks, grazing deferment such as rest-rotation are utilized, but these practices demand costly infrastructure and concentrate animals in low production areas. These practices are not widespread in dry steppes; and (4) coordination of reserve pastures that can mitigate the effects of drought.

Replicability

122. Specific mechanisms have been incorporated in the project design for replication of positive experiences throughout the project area, to other areas within Argentina, and internationally. Given the vastness of Patagonia, there will be a need to continue the project for an additional 5 years to be able to reach the large number of remote producers. By the close of the project, there will an equivalent of five years of resources, channelled through the Ovine Law for continued interventions that will replicate successful experiences.

123. 75% of Argentina consists of arid and semi-arid regions with similar characteristics and problems. Technologies tested in the GEF alternative and the Patagonia network will be important to the remaining arid and semi-arid provinces: San Luis, Mendoza, Jujuy, Salta, Catamarca, Santiago del Estero. Several of the project partners will have the capacity to disseminate the lessons learnt to institutions and projects that are in a position to replicate those lessons. For example, INTA is governed by regional councils with representatives from producers, provinces, universities, etc. These councils meet 6 times per year covering 2-3 provinces. This forum will be important to connect and perhaps expand the network to a broader

audience. INTA already has publications, multiple forums, and e-mailing instruments that reach 5,000 key persons a day, in addition to similar mechanisms within SAGPyA and the producers' federations. Tools, such as the updated simulation models will be instantly replicable once disseminated. A total of \$ 159,000 of project resources will be allocated to the materials for dissemination of information and experiences that will lead to replication. The costs of the Patagonian network will also contribute directly to replication (See replication budget, Section IV, Part VIII).

124. The structures created for the NAP also provide structures to disseminate lessons learnt. The NAP is supported by a National Steering Commission consisting of federal government (Ministries and decentralized entities), provincial (through the federal environment commission), civil society (RIOD), and representatives of producer's organizations, academic and investigative institutions, and international agencies.

125. Internationally, Argentina is a signatory to the GEF-WISP project, which is a mid-sized project aimed at increasing the flow of information to and from pastoralists and decision-makers and establishing an effective lobby for the interests of pastoralists and their families in the development process. The subscribers to the WISP project could benefit directly from tools such as the simulation model and the exchange of experiences to and from the project. As the WISP project develops, the connectivity between the projects will be developed. At this point a direct connection to the Patagonia network is foreseeable, access to pastoralist leaders, and connections of WISP to Patagonia's counterpart projects are all viable options. WISP would be the vehicle for communicating the lessons learnt from this project to other groups or projects in the world with a capacity to replicate those lessons.

126. Argentina will also disseminate lessons learnt through her role as an important regional and international facilitators of the Sub-regional Action Plan for the Sustainable Development of the Greater American Chaco (PAS Chaco), which includes the participation of Paraguay and Bolivia, and through the Sub-regional Action Plan for the Sustainable Development of the American Puna (PAS Puna) involving Bolivia, Chile, Peru, and Ecuador. In addition, Argentina's partnership in the UNCCD and specific activities within the Regional Action Plan for Latin America and the Caribbean will provide valuable opportunities to disseminate lessons learnt.

PART III. Management Arrangements

Consultation, coordination and collaboration between IA's, and IA's and EXA's

127. During the project design phase there has been extensive consultation and coordination between IA's, specifically UNDP, FAO and IFAD to enhance stakeholder participation and to avoid overlapping and duplication of functions in the target area. IFAD, is working on the first phase of the PRODERPA program, which will impact small producers in Patagonia's dry areas and also PNUD, SAGPyA and SAyDS working with NAP in the same region. Several meetings with IA's were conducted during the elaboration of the concept paper and PDF-B which were later extended to the six Provinces. All IA's and EXA's were invited to participate in the Project

Coordination Committee to ensure ongoing coordination and thus avoid overlapping. It is important to mention that the implementation of the PDF-B and full project activities is also facilitating the coordination process between a wide range of national EXA's, more specifically (INTA's programs and projects, LO, PSA, PROINDER, PROLANA, CAMBIO RURAL, PROFAM, PROHUERTA, MINIFUNDIOS, MOHAIR Program, CDR, and provincial programs such as PDGLS among others), all of which are related to both rangeland and natural resources management and improvement of sustainable livelihoods, but have lacked the space to coordinate efficiently.

Implementation/execution arrangements

128. The GoA will execute this 5 year project under the UNDP National Execution (NEX) mode. In its capacity as executing agency, the Ministry of Health and Environment (Secretariat of Environment and Sustainable Development) will be responsible for directing the project, meeting the immediate objectives and projected outputs, making effective and efficient use of the resources allocated in accordance with this Project Document, and ensuring effective coordination between the Project and the other existing projects in the country dealing with land degradation and sustainable land management, including coordination with FAO and IFAD.

129. The Project will be coordinated through a **Project Coordination Committee (PCC)**, which will serve as the political entity for executing the project, acting as a steering committee. The PCC is chaired by a senior level representative of SAyDS, who is also the UNCCD focal point. Other committee members are: UNDP-Argentina, and representatives of principal national level associates and co-financers: SAGPyA, Regional Projects (CDR), FAO, IFAD, MM, INTA, GTZ, MRECIC, SENASA, APN, INAI, RIOD, CONAE, WISP, Big, Small and Mid Size producers, Environment and Production Ministry of each Province, CyT, National Universities, local councils, and Patagonian Parliament. Once the Project is in the process of being approved, SAyDS, together with UNDP, will take on the responsibility of forming the PCC, ensuring the participation of all the interested sectors. The PCC has met twice during the project development stage. During project implementation, the committee will meet once a year, after the consensus on AWP.

130. The project staff structure will be comprised of a **National Project Director (NPD)** and a **National Project Coordinator (NPC)**. In compliance with Argentine protocol, The GEF National Focal Point (SAyDS) will serve as the NPD, with responsibilities for supervising the project and working in a liaison capacity with the NPC. The NPC is the project manager of the administration and execution of the activities provided for in the project. To implement the project, a **Project Coordination Unit (PCU)** will be comprised of the NPD and the NPC with the support of a technical assistance team comprised of four specialists, plus six members, one of each province and one executive secretary. The PCU will serve both as a representative unit and consensus framework within the REPAM. Additional part time staff, such as an administrative-accountant will be required to complete the staffing pattern.

131. The PCU will work through an existing structure (**UEP or the Executive Provincial Unit of the Sheep Law**). This Unit is integrated by a government official, a representative of the producers and one of INTA. The addition of a fourth component from the Environment

Provincial agency will be fostered, as far as possible the same member of the PCU. The GEF project will operate through this structure in order to avoid unnecessary bureaucracy and to unite productive and environmental aspects of the Sheep Law. The information relating to SLM will be transmitted to the main stakeholders through REPAM (Producer Federations, Provincial representatives, SAGPyA, and SAyDS). This non-formal private-public network will try to build a joint vision of development in its environmental and productive aspects between political and public decision-makers on one hand and with representatives of producer's organizations on the other. The NPC will be the Executive Coordinator of the network that, from the beginning will incorporate about 60 organizations that were identified during the PDF-B process in each province. In addition, access to the DSS and GIS generated through the GEF Project. REPAM will be a Reference Institution within the region that will generate annual or biannual meetings that may coincide with the annual Forums of the Sheep Law.

132. On the Provincial and local scales the GEF will facilitate the institution of a SITT (Integrated Technology Transfer System), that will reach producers with SLM techniques, and information on Early Warning Systems and Models. These facilitators will work through Producer Associations and Producers Cooperatives. An Inception Workshop will be held in each Province in order to develop the AWP.

133. NPD, NPC and EC will follow the norms and procedures specified in UNDP's NEX manual for project execution. UNDP will monitor the direction and guidance of the project in order to contribute to maximize the scope, impact and quality of its outputs. In addition, as a GEF implementing agency, it will be responsible for administering the resources in accordance with the immediate objectives of the Project Document, and observing its own guiding principles of transparency, competitiveness, efficiency and economy. Financial management and accountability of resources as well as other project execution activities will be under UNDP country office direct supervision. The UNDP Argentina office will be able to charge the project directly for Implementation Support Services (ISS) on a transaction basis using a universal price list, after the development of annual operative program, in cases agreed by project counterparts. If required, local NGOs and/or research and academic institutions could be sub-contracted by the project to carry out specific activities under their field of expertise in accordance with the CDMs.

134. SAyDS, through UNDP/PMU, will prepare the Annual Work Plan (AWP) reflecting the Project's activities and the outcomes to be achieved through their implementation. The Plan will indicate the implementation periods of each activity and the parties responsible for carrying them out. During the elaboration of the AWP, the participation of the project partners will be essential for the success of the planning phase. These are UNDP, FAO, IFAD as well as SAyDS, SAGPyA and INTA.

135. UNDP Argentina will be responsible to supervise and administer the full size phase of the programme. UNDP will closely coordinate with FAO and IFAD in terms of technical assistance and expert provision during the conformation of the PCU. Sufficient authority will be necessary in the PCU staff in order to negotiate with government bodies, and in particular with the programme's main partners (SAyDS, SAGPyA, INTA, Staff technical Provinces and CDR) but also enough flexibility to discuss issues regarding the design of the bigger programme with donors, financial entities as well as with NGOs. UNDP will be responsible for the project's

financial reporting and administrative controls during this execution phase and will hire the team of consultants to carry out the project.

136. Finally, in order to accord proper acknowledgement to GEF for providing funding, a GEF logo should appear on all relevant GEF project publications, including among others, project hardware and vehicles purchased with GEF funds. Any citation on publications regarding projects funded by GEF should also accord proper acknowledgment to GEF. The UNDP logo should be more prominent and separated from the GEF logo if possible as, UN visibility is important for security purposes.

137. This project will add, to already ongoing activities, a framework for integrated SLM in the six provinces by developing and strengthening joint policies and institutions. This project will have a strong focus on combat of land degradation and sustainable use of ecosystems. Co-ordination mechanisms with the other GEF Implementing Agencies will be developed through participation in Steering Committee meetings as well as informal information sharing and networking.

PART IV. Monitoring and Evaluation

138. Project monitoring and evaluation will be conducted in accordance with established UNDP and GEF procedures and will be provided by the project team and the UNDP Country Office (UNDP-CO) with support from UNDP/GEF. The Logical Framework Matrix provides *performance* and *impact* indicators for project implementation along with their corresponding *means of verification* (see Executive Summary, Annex B). These will form the basis on which the project's Monitoring and Evaluation system will be built.

Monitoring and Reporting

1.1 Project Inception Phase

139. A *Project Inception Workshop* will be conducted with the full project team, relevant government counterparts, co-financing partners, the UNDP-CO and representation from the UNDP-GEF Regional Coordinating Unit, as well as UNDP-GEF (HQs) as appropriate.

140. A fundamental objective of this Inception Workshop will be to assist the project team to understand and take ownership of the project's goals and objectives, as well as finalize preparation of the project's first annual work plan on the basis of the project's logframe matrix. This will include reviewing the logframe (indicators, means of verification, assumptions), imparting additional detail as needed, and on the basis of this exercise finalize the Annual Work Plan (AWP) with precise and measurable performance indicators, and in a manner consistent with the expected outcomes for the project.

141. Additionally, the purpose and objective of the Inception Workshop (IW) will be to: (i) introduce project staff with the UNDP-GEF *expanded team* which will support the project during its implementation, namely the CO and responsible Regional Coordinating Unit staff; (ii) detail the roles, support services and complementary responsibilities of UNDP-CO and RCU staff vis à

vis the project team; (iii) provide a detailed overview of UNDP-GEF reporting and monitoring and evaluation (M&E) requirements, with particular emphasis on the Annual Project Implementation Reviews (PIRs) and related documentation, the Annual Project Report (APR), Tripartite Review Meetings, as well as mid-term and final evaluations. Equally, the IW will provide an opportunity to inform the project team on UNDP project related budgetary planning, budget reviews, and mandatory budget rephasings.

142. The IW will also provide an opportunity for all parties to understand their roles, functions, and responsibilities within the project's decision-making structures, including reporting and communication lines, and conflict resolution mechanisms. The Terms of Reference for project staff and decision-making structures will be discussed again, as needed, in order to clarify for all, each party's responsibilities during the project's implementation phase.

1.2 Monitoring responsibilities and events

143. A detailed schedule of project reviews meetings will be developed by the project management, in consultation with project implementation partners and stakeholder representatives and incorporated in the Project Inception Report. Such a schedule will include:

- (i) tentative time frames for Reviews, Project Coordination Committee Meetings, (or relevant advisory and/or coordination mechanisms)
- (ii) project related Monitoring and Evaluation activities (See also Indicative Monitoring and Evaluation Budget, Section II, Part III).

144. Day to day monitoring of implementation progress will be the responsibility of the Project Coordinator based on the project's Annual Work plan and its indicators. The Project Team will inform the UNDP-CO of any delays or difficulties faced during implementation so that the appropriate support or corrective measures can be adopted in a timely and remedial fashion.

145. Periodic monitoring of implementation progress will be undertaken by the UNDP-CO through quarterly meetings with the project proponent, or more frequently as deemed necessary. This will allow parties to take stock and to troubleshoot any problems pertaining to the project in a timely fashion to ensure smooth implementation of project activities.

146. Annual Monitoring will occur through the ***Tripartite Review (TPR)***. This is the highest policy-level meeting of the parties directly involved in the implementation of a project. The project will be subject to Tripartite Review (TPR) at least once every year. The first such meeting will be held within the first twelve months of the start of full implementation. The project proponent will prepare an Annual Project Report (APR) and submit it to UNDP-CO and the UNDP-GEF regional office at least two weeks prior to the TPR for review and comments.

147. The APR will be used as one of the basic documents for discussions in the TPR meeting. The project proponent will present the APR to the TPR, highlighting policy issues and recommendations for the decision of the TPR participants. The project proponent also informs the participants of any agreement reached by stakeholders during the APR preparation on how to resolve operational issues. Separate reviews of each project component may also be conducted if necessary.

Terminal Tripartite Review (TTR)

148. The terminal tripartite review is held in the last month of project operations. The project proponent is responsible for preparing the Terminal Report and submitting it to UNDP-CO and LAC-GEF's Regional Coordinating Unit. It shall be prepared in draft at least two months in advance of the TTR in order to allow review, and will serve as the basis for discussions in the TTR. The terminal tripartite review considers the implementation of the project as a whole, paying particular attention to whether the project has achieved its stated objectives and contributed to the broader environmental objective. It decides whether any actions are still necessary, particularly in relation to sustainability of project results, and acts as a vehicle through which lessons learnt can be captured to feed into other projects under implementation of formulation.

149. The TPR has the authority to suspend disbursement if project performance benchmarks are not met. Benchmarks are provided in Annex .../will be developed at the Inception Workshop, based on delivery rates, and qualitative assessments of achievements of outputs.

150. 1.3 *Project Monitoring Reporting* will be undertaken by the Project Coordinator in conjunction with the UNDP-GEF extended team. The coordinator will be responsible for the preparation and submission of the following reports that form part of the monitoring process. Items (a) through (f) are mandatory and strictly related to monitoring, while (g) through (h) have a broader function and the frequency and nature is project specific to be defined throughout implementation.

(a) Inception Report (IR)

151. A Project Inception Report will be prepared immediately following the Inception Workshop. It will include a detailed First Year/ Annual Work Plan divided in quarterly time-frames detailing the activities and progress indicators that will guide implementation during the first year of the project. This Work Plan would include the dates of specific field visits, support missions from the UNDP-CO or the Regional Coordinating Unit (RCU) or consultants, as well as time-frames for meetings of the Project Coordination Committee. The Report will also include the detailed project budget for the first full year of implementation, prepared on the basis of the Annual Work Plan, and including any monitoring and evaluation requirements to effectively measure project performance during the targeted 12 months time-frame. In addition, the Inception Report will include a more detailed narrative on the institutional roles, responsibilities, coordinating actions and feedback mechanisms of project related partners, including sections on progress to date, project establishment, start-up activities, and an update of any changed external conditions that may effect project implementation. The finalized report will be circulated to project counterparts who will respond with comments or queries within a period of one calendar month. Prior to this circulation of the IR, the UNDP Country Office and UNDP-GEF's Regional Coordinating Unit will review the document.

(b) Annual Project Report (APR)

152. The APR is a UNDP requirement and part of UNDP's Country Office central oversight, monitoring and project management. It is a self -assessment report by project management to the CO and provides input to the country office reporting process and the ROAR, as well as forming

a key input to the Tripartite Project Review. An APR will be prepared on an annual basis prior to the Tripartite Project Review, to reflect progress achieved in meeting the project's Annual Work Plan and assess performance of the project in contributing to intended outcomes through outputs and partnership work.

153. The format of the APR is flexible but should include the following:

- An analysis of project performance over the reporting period, including outputs produced and, where possible, information on the status of the outcome
- The constraints experienced in the progress towards results and the reasons for these
- The three (at most) major constraints to achievement of results
- AWP, CAE and other expenditure reports (ERP generated)
- Lessons learned
- Clear recommendations for future orientation in addressing key problems in lack of progress

(c) Project Implementation Review (PIR)

154. The PIR is an annual monitoring process mandated by the GEF. It has become an essential management and monitoring tool for project managers and offers the main vehicle for extracting lessons from ongoing projects. Once the project has been under implementation for a year, a Project Implementation Report must be completed by the CO together with the project. The PIR can be prepared any time during the year (July-June) and ideally prior to the TPR. The PIR should then be discussed in the TPR so that the result would be a PIR that has been agreed upon by the project, the executing agency, UNDP CO and the concerned RC.

155. The individual PIRs are collected, reviewed and analysed by the RCs prior to sending them to the focal area clusters at the UNDP/GEF headquarters. The focal area clusters supported by the UNDP/GEF M&E Unit analyse the PIRs by focal area, theme and region for common issues/results and lessons. The TAs and PTAs play a key role in this consolidating analysis.

156. The focal area PIRs are then discussed in the GEF Interagency Focal Area Task Forces in or around November each year and consolidated reports by focal area are collated by the GEF Independent M&E Unit based on the Task Force findings.

157. The GEF M&E Unit provides the scope and content of the PIR. In light of the similarities of both APR and PIR, UNDP/GEF has prepared a harmonized format for reference.

(d) Quarterly Operational Reports:

158. Short reports outlining main updates in project progress will be provided quarterly to the local UNDP Country Office and the UNDP-GEF regional office by the project team.

(e) Periodic Thematic Reports

159. As and when called for by UNDP, UNDP-GEF or the Implementing Partner, the project team will prepare Specific Thematic Reports, focusing on specific issues or areas of activity. The request for a Thematic Report will be provided to the project team in written form by UNDP and will clearly state the issue or activities that need to be reported on. These reports can be used as a form of lessons learnt exercise, specific oversight in key areas, or as troubleshooting exercises to evaluate and overcome obstacles and difficulties encountered. UNDP is requested to

minimize its requests for Thematic Reports, and when such are necessary will allow reasonable timeframes for their preparation by the project team.

(f) Project Terminal Report

160. During the last three months of the project the project team will prepare the Project Terminal Report. This comprehensive report will summarize all activities, achievements and outputs of the Project, lessons learnt, objectives met, or not achieved, structures and systems implemented, etc. and will be the definitive statement of the Project's activities during its lifetime. It will also lay out recommendations for any further steps that may need to be taken to ensure sustainability and replicability of the Project's activities.

(g) Technical Reports

161. As part of the Inception Report, the project team will prepare a draft Reports List, detailing the technical reports that are expected to be prepared on key areas of activity during the course of the project, and tentative due dates. Where necessary this Reports List will be revised and updated, and included in subsequent APRs. Technical Reports may also be prepared by external consultants and should be comprehensive, specialized analyses of clearly defined areas of research within the framework of the project and its sites. These technical reports will represent, as appropriate, the project's substantive contribution to specific areas, and will be used in efforts to disseminate relevant information and best practices at local, national and international levels.

(h) Project Publications

162. Project publications will form a key method of crystallizing and disseminating the results and achievements of the Project. These publications may be scientific or informational texts on the activities and achievements of the Project, in the form of journal articles, multimedia publications, etc. These publications can be based on Technical Reports, depending upon the relevance, scientific worth, etc. of these Reports, or may be summaries or compilations of a series of Technical Reports and other research. The project team will determine if any of the Technical Reports merit formal publication, and will also (in consultation with UNDP, the government and other relevant stakeholder groups) plan and produce these publications in a consistent and recognizable format. (See Table 6 for budget of publications).

2. INDEPENDENT EVALUATION

The project will be subjected to at least two independent external evaluations as follows:-

(i) Mid-term Evaluation

163. An independent Mid-Term Evaluation will be undertaken at the end of the second year of implementation. The Mid-Term Evaluation will determine progress being made towards the achievement of outcomes and will identify course correction if needed. It will focus on the effectiveness, efficiency and timeliness of project implementation; will highlight issues requiring decisions and actions; and will present initial lessons learned about project design, implementation and management. Findings of this review will be incorporated as recommendations for enhanced implementation during the final half of the project's term. The organization, terms of reference and timing of the mid-term evaluation will be decided after

consultation between the parties to the project document. The Terms of Reference for this Mid-term evaluation will be prepared by the UNDP CO based on guidance from the Regional Coordinating Unit and UNDP-GEF.

(ii) Final Evaluation

164. An independent **Final Evaluation** will take place prior to the terminal review meeting, and will focus on the same issues as the mid-term evaluation and will seek information specific to the re-engineering of the Master Plan. The final evaluation will also look at impact and sustainability of results, including the contribution to capacity development and the achievement of global environmental goals.

Audit Clause

165. The Government of Argentina will provide the Resident Representative with certified periodic financial statements, and with an annual audit of the financial statements relating to the status of UNDP (including GEF) funds according to the established procedures set out in the Programming and Finance manuals. The Audit will be conducted by the legally recognized auditor of the Government, or by a commercial auditor engaged by the Government. The project foresees an audit to be conducted at the end of the project by a recognized national firm.

3. LEARNING AND KNOWLEDGE SHARING

166. Results from the project will be disseminated within and beyond the project intervention zone through a number of existing information sharing networks and forums. In addition:

- ◆ The project will participate, as relevant and appropriate, in UNDP/GEF sponsored networks, organized for Senior Personnel working on projects that share common characteristics. UNDP/GEF shall establish a number of networks, such as Integrated Ecosystem Management, eco-tourism, co-management, etc, that will largely function on the basis of an electronic platform.
- ◆ The project will identify and participate, as relevant and appropriate, in scientific, policy-based and/or any other networks, which may be of benefit to project implementation though lessons learned.

167. The project will identify, analyze, and share lessons learned that might be beneficial in the design and implementation of similar future projects. Identify and analyzing lessons learned is an on-going process, and the need to communicate such lessons as one of the project's central contributions is a requirement to be delivered not less frequently than once every 12 months. UNDP/GEF shall provide a format and assist the project team in categorizing, documenting and reporting on lessons learned. To this end a percentage of project resources will need to be allocated for these activities.

Table 4. Indicative Monitoring and Evaluation Work Plan and Budget

Type of M&E activity	Responsible Parties	Budget US\$ <i>Excluding project team Staff time</i>	Time frame
Inception Workshop	<ul style="list-style-type: none"> ▪ Project Coordinator ▪ UNDP CO ▪ UNDP GEF ▪ UNCCD 	12,500	Within first two months of project start up
Inception Report	<ul style="list-style-type: none"> ▪ Project Team ▪ UNDP CO 	None	Immediately following IW
Measurement of Means of Verification for Project Purpose Indicators	<ul style="list-style-type: none"> ▪ Project Coordinator will oversee the hiring of specific studies and institutions, and delegate responsibilities to relevant team members 	7,500	Start, mid and end of project
Measurement of Means of Verification for Project Progress and Performance (measured on an annual basis)	<ul style="list-style-type: none"> ▪ Oversight by Project GEF Technical Advisor, Project Coordinator and Zone Coordinators. ▪ Measurements by regional field officers and local IAs 	29,000	Annually prior to APR/PIR and to the definition of annual work plans
APR and PIR	<ul style="list-style-type: none"> ▪ Project Team ▪ UNDP-CO ▪ UNDP-GEF ▪ UNCCD 	\$10,000	Annually
TPR and TPR report	<ul style="list-style-type: none"> ▪ Government Counterparts ▪ UNDP CO ▪ Project team ▪ UNDP-GEF Regional Coordinating Unit ▪ UNCCD 	None	Every year, upon receipt of APR
Project Coordination Committee Meetings	<ul style="list-style-type: none"> ▪ Project Coordinator ▪ UNDP CO ▪ UNCCD 	\$ 70,400	Following Project IW and subsequently at least once a year
Executive Committee Meetings	<ul style="list-style-type: none"> ▪ Project Coordinator ▪ UNDP-CO Resident Representative ▪ Foreign Affairs ▪ 	\$15,000	Yearly
Periodic status reports	<ul style="list-style-type: none"> ▪ Project team 	None.	To be determined by Project team and UNDP CO
Technical reports	<ul style="list-style-type: none"> ▪ Project team ▪ Hired consultants as needed 	\$ 10,000	To be determined by Project Team and UNDP-CO
Mid-term External Evaluation	<ul style="list-style-type: none"> ▪ Project team ▪ UNDP- CO ▪ UNDP-GEF Regional Coordinating Unit ▪ External Consultants (i.e. evaluation team) 	\$ 30,000	At the mid -point of project implementation.
Final External Evaluation	<ul style="list-style-type: none"> ▪ Project team, ▪ UNDP-CO ▪ UNDP-GEF Regional 	\$ 30,000	At the end of project implementation

	<ul style="list-style-type: none"> ▪ Coordinating Unit ▪ External Consultants (i.e. evaluation team) 		
Terminal Report	<ul style="list-style-type: none"> ▪ Project team ▪ UNDP-CO ▪ 	None.	At least one month before the end of the project
Publication of lessons learnt <i>Note: replication is budgeted separately</i>	<ul style="list-style-type: none"> ▪ Project team ▪ UNDP-GEF Regional Coordinating Unit (suggested formats for documenting best practices, etc) 	\$ 17,500 (average 3,500 per year)	Yearly
Baseline and end-of-project knowledge and attitudes survey of breeders, educators, experts and opinion leaders.	<ul style="list-style-type: none"> ▪ External Consultant 	\$ 175,000	Within first two months of project start up and at the end of project implementation.
Audit	<ul style="list-style-type: none"> ▪ UNDP-CO ▪ Project team 	\$ 31,940	Yearly
Visits to field sites (UNDP staff travel costs to be charged to IA fees)	<ul style="list-style-type: none"> ▪ UNDP Country Office ▪ UNDP-GEF Regional Coordinating Unit (as appropriate) ▪ Government representatives 	\$ 18,500 (average one visit per year)	Yearly
TOTAL INDICATIVE COST <i>Excluding project team staff time and UNDP staff and travel expenses</i>		\$ 428,340	

Part V. Legal Context

168. The present Project Document will be the instrument referred to under Article 1 of the Basic Agreement for Technical Assistance between the Government of the Republic of Argentina and the United Nations Development Program (UNDP), signed by both parties on February, 26th, 1985. For purposes of the Basic Agreement for Technical Assistance, where the term “Government Executing Agency” is mentioned, it is understood to mean the host country’s executing organization as described in said Agreement.

169. Any substantial revision of the Project Document that has significant implications for the contents of the Project, as well as the use of the allocated resources, will require the approval of the Project Steering Committee and the signature of the National Project Director, in representation of the Public Ministry,.

170. The following budgetary revisions will require only the approval and signature of the Resident UNDP Representative:

- Compulsory annual revisions, reflecting the real expenses of the previous year, duly certified by the national counterpart, and the reprogramming of unused funds for

subsequent years, based on the delivery of inputs as agreed upon in this Project Document.

- Revisions that do not entail significant changes in the immediate objectives, the project's activities or its outputs, but that result from a redistribution of the inputs agreed upon, or are due to increased expenses caused by inflation.

171. The substantial or budgetary revisions will be prepared by UNDP/PMU, in accordance with the requirements of the Project itself.

172. Furthermore, in case there are adjustments to the immediate objectives, the outputs or the activities proposed in the UNDP Project Document, substantial revisions will need to be made in advance, and must receive the signed approval of both UNDP and the Executing Agency

SECTION II: STRATEGIC RESULTS FRAMEWORK AND GEF INCREMENT

Part 1: Incremental Cost Analysis

A. National development objective for the ovine sector (Objective of Sheep Law # 25.422 April 2001).

173. “To update and modernize ovine production systems in order to provide their sustainability in time and consequently maintain and increment rural work places and population settlement”

B. Systems boundary

174. The temporal boundary for the project is 5 years, sufficient time to properly carry out the project taking into consideration the favourable conditions present in the country and the strategic partnerships developed for the implementation of the sector initiatives and those developed during the preparatory phase. The temporal scope of the LO extends to 2010 with a reinvestment of revolving funds captured during this phase for an additional five year until 2015. Therefore, GEF actions will contribute to additional indirect global benefits through leveraged funding for an additional 5 years and beyond, continuing as re-investment of revolving funds continues.

175. The geographic limits of the project include the provinces of Neuquén, Rio Negro, Chubut, and Santa Cruz. In addition, the province of La Pampa and the Argentine territory within the island of Tierra del Fuego corresponding to the province of Tierra del Fuego, Antartica, and the South Atlantic Islands (maps 1 and 2). Please note that *the Islas Malvinas (Falkland Islands) are not included* in the project as erroneously indicated in the maps. Also note that the maps will be updated prior to workplan entry.

176. The system boundary for the project was limited during the PDF-B phase to encompass the land degradation aspects associated with animal grazing systems, which is the most widespread land degradation factor within Patagonia. The development of the Patagonia Network, and the debate and information will create the exposure to land degradation issues and procedures, mechanisms, and instruments needed to extend the debate to the mining and petroleum/natural gas sectors. Given the enormous size of the Patagonian territory, project resources would otherwise be spread too thin to demonstrate an impact. Once Outcome 1 is achieved for the target sector, the same mechanisms will serve to extend the debate on land degradation, and thus the system boundary will then extend (in dialogue and debate) to the other mentioned sectors. The system boundary for outcomes 2-4 remains within the livestock management realm within the provinces and territories mentioned above of La Pampa, Rio Negro, Santa Cruz, Neuquen, Chubut, Tierra del Fuego. The area of intervention of the project that will directly address land degradation is the area receiving support of the sheep law within the mentioned provinces where land degradation processes occur. The project will engage agency authorities and provincial ministries of production and environment (or equivalent) to promote and finance SLM while involving community representatives and stakeholder groups within a holistic territory based approach and thus engage them in the political process. Within this area, a partnership between government agencies, municipalities, national and international programs will work together to transfer technology and create opportunities for breeder participation as part of the solution of land based problems at the community level.

C. Incremental cost assessment

Baseline Assessment

177. The full GEF project takes into account baseline and co-financing at the federal, provincial, and local levels. Some investments in the SLM process have been made. The theme of land degradation control and land-use planning has been initiated and there are baseline activities in at both the national and provincial levels that correspond to the project outcomes. The baseline assessment for Outcome 1⁹ are expenditures for technical development with respect to the Network, Decision Support System, or training to connect groups and improve use. The value of GIS capability by SAGPyA, INTA, or the Secretariat for Environment has not been determined.

178. The LO is the principal baseline investment. For the purposes of calculating incremental costs, this is considered to be a “sustainable baseline” meaning that it will be considered as both baseline and co-financing. LO money will be used for on-the-ground investments in livestock management to which the GEF alternative will provide environmental processes that will contribute to the achievement of indirect global benefits.

179. The NAP National Focal Point is the Soil Conservation and Combat Desertification Office from SAyDS. Its annual operational budget is up to 90.000 US\$, including salaries, equipment, travels, DSA, and local financial aids.

180. This Office is also responsible for the LADA Project, a global FAO/GEF project, and the Argentine Financial Partnership (AFP), promoted by The UNCCD Global Mechanism with the support from other cooperation agencies. The AFP financial resources totalized 320.000 US\$ for 2005/2007 period, composed by Global Mechanism (US\$ 150.000) and UNDP (US\$50.000) funds, and completed with the German Cooperation GTZ funds for the project “Support to NAP” (US\$ 120.000).

181. For *Outcome 1*, the baseline assessments¹⁰ are

- Expenditures for technical development with respect to the Network, Decision Support System, or training to connect groups and improve use. In relation to networking, the projected REPAM will build on the baseline of the NAP initiative of the focal point of desertification programmed (SAyDS \$100.000), that has developed ties within provincial and national environmental institutions including legislation interaction within the Parlamento Patagonico (Provincial Parliament \$14.400), producer’s associations such as cooperatives (Small Breeders: \$3.600) and rural associations (Rural Societies: \$3.600) that facilitate the interaction, and some non-governmental institutions such as RIOD (NGO's \$3.600).
- GIS capability, Decision Support Systems, and Early Warning Systems has been developed by SAGPyA, (SAGPyA \$70.000), INTA (DSS GIS, INTA/provincias \$395.000) and Universities have developed elements of the early warning drought

⁹ Roman, Marcela

¹⁰ Roman, Marcela

systems and satellite imagery analysis for monitoring primary production (UBA/IFEVA \$30.000)

182. Within the baseline of *Outcome 2*,

- The technological basis of the GEF initiative is the TME that has been developed by INTA and producers in the last 15 years and has been applied by 500 producers on approximately 2 M ha. over a wide range of ecosystems through a network of extension agencies (INTA/ Extension system \$363.000), and some provinces such as Rio Negro and Neuquén have developed extension agencies also (Provinces / Extension system \$300.000). University of Buenos Aires has also developed rotational or deferred grazing techniques (Universities \$50.000).
- The Wool Quality Improvement Assistance Program (PROLANA), 1994, provides training and technical assistance in quality improvement and control.
- The National Patagonian Ovine Meat Project that provides the production, promotion, and commercialization of meat. The project develops multi-purpose breeds for both meat and wool production and improves meat breeds
- The Federal Program for the Productive Re-conversion of Small and Medium Agribusinesses (CAMBIO RURAL), 1993, managed by INTA to prepare small and medium businesses for change and competitive and open market conditions (SAGPyA/C.Rural: \$534.800).
- The Agriculture Social Program (PSA). The project provides technical and financial assistance and training for income generation amongst small producers. Through PSA activities, producers are connected to policies, programs, and projects at the local, provincial, and national levels. The PSA structure is important for reaching remote small producers, many of whom pay transient workers. The PROINDER project is a 20-year World Bank funded initiative with only one year left to run. Although PROINDER will not form part of the financial baseline for the project, the projects structure and lessons learnt will be critical to the implementation of the GEF alternative. (SAGPyA/PSA/PROINDER: \$794.500).
- Producers associations host training programs (Small Breeders \$96.000 Rural Societies \$96.000, Provinces training \$15.900).
- Several baseline initiatives are listed in the baseline analysis that relate to the production alternatives. Although they are not technically part of the systems boundary of this project, they are related to alternative land uses and their results could be validated and exchanged within the network as possible alternatives. The first is the Choique project (SAGPyA/P. Choique: \$578.600), which controls exotic species that cause a risk to native fauna. The other baseline project is a national program to conserve and the Lama Guanicoe (SAGPyA/P. Guanicoe \$165.500)..
- 177.

183. Within *outcome 3*, the main baseline funds are those of the

- Sheep Law to the Patagonian provinces, that amount to roughly \$6,9 M/ year (SAGPyA/: LO \$22.030.748). This program finances rangeland evaluation, planning, production infrastructure and livestock through credits that are reimbursed into revolving funds and subsidies.

- Provinces have established incentives for those who access to the LO in the form of tax exemptions, and have created complementary provincial sheep laws (Provinces: incentives \$5.697.116).
- In the development of alternative production methods, the provinces only spend an estimated \$10,000/year (Provinces: alt. production \$50.000).
- Additional baseline poverty reduction programs needed to complement SLM initiatives (Nacional Poverty Reduction \$397.445, Provinces: \$50.000).

184. The mentioned figures are calculated on a per-year basis to determine the direct relationship to the GEF project, Argentina will provide \$ 31.839.809 in baseline activities and services directly related to the GEF project.

185. In terms of baseline social infrastructure, the national agencies and the provinces have formed the Executive Planning Units (UEP) that coordinate province level implementation of the Sheep Law investments and projects. In addition to that structure, the Rural Development Committees (CDR) are multi-agency boards that provide a multi-agency and multi-sector planning function to the CAMBIO RURAL investments (see baseline assessment). The project will however work within this framework, thus qualifying the structures as an important baseline to the project. The producers at the grassroots level have formed associations and cooperatives. However, this process is incomplete, especially for the more remote areas. The mid scale and large producers form Rural Societies. All of the mentioned levels connect to federations, or second-tier breeders organizations. All of the mentioned levels require training and technical assistance to effectively lobby for their members needs and to connect to resources and channel programs and projects to their membership¹¹. The important baseline projects listed in this section are described in more detail in the baseline analysis (paragraphs 52-62).

Status Quo without the GEF alternative.

186. Traditional pastoral systems in Patagonia are no longer sustainable because: (1) they have caused a reduction in biodiversity in overgrazed areas, alterations in nutrient cycling and water balance, erosion and soil compaction that affect wildlife habitats (specially in wetlands) and have silted air and water courses; (2) they have induced a reduction in productivity through a net loss of top soil and associated nutrients, transitions from grass to shrub and dwarf shrub steppes that increase water loss through runoff and evaporation; (3) they have lost profitability because of a market-driven net reduction in wool and meat prices in relation to production costs, and because animal production has diminished and its variability increased, with diminished income reducing on-farm work opportunities, migration, and abandonment of. Farms and lost of cultural practices and livelihood; (4) high risk due to exposure to extreme climatic events such as droughts or snowstorms.

187. Without the GEF alternative, the baseline scenario will continue. Sector investments without the up-scaling of TME technology and without a SLM focus will cause expansion of the sector with the likelihood of point intensive damage in areas where carrying capacity has been exceeded, causing more land degradation. The disconnection of the small producers from information and services will lead to larger numbers of small producers with small flocks, below

¹¹ Cite DCI by TOP, 2005

the breakeven point, leading to the likelihood of failure and more overgrazing of pastures with consequent deterioration. Decision makers will continue to develop incentive programs without knowledge of the real effects of those programs on poverty and on the land base, ultimately exacerbating land degradation. Existing information will not be used for territorial planning or for discussion to which the opinions of the breeders will remain distant from the decision-making process of legislators. The poverty situation will deepen without timely information that enables breeders to manipulate their flock sized in accordance to best predictions. The public at large will remain unaware of the link between their productive processes and livelihoods and global benefits and global processes, especially the school age children who are tomorrow's breeders, affecting the attitudes towards the acceptability of the next generation towards new technologies.

Global environmental objective

188. The project seeks remove the barriers that limit the national response to the root problems and thereby assure ecosystem resilience and stability by reversing the process of land degradation that leads to soil and fertility loss and losses of global biodiversity, which increases the vulnerability of the local population to the effects of poverty and drought, ultimately deepening the process of land degradation. The project will also have additional indirect global benefits in the focal areas of Biodiversity and Climate Change.

Alternative

189. The GEF alternative will add SLM concerns (land functionality analysis, inter-sector planning) to the baseline situation by funding and/or co-financing activities that will remove the political, information and capacity barriers thus enabling the mainstreaming of SLM within the livestock sector, thereby creating the instruments, mechanisms, information and processes to achieve broader action on the multiple-sector issues that contribute to land degradation within Patagonia. Sustainable land management will be achieved by taking advantage of the mechanisms created through Argentina's political reform of the ovine sector by creating instruments for upstream and downstream networking and information exchange, engagement of multiple sectors in dialogue about land degradation, development of information and capacities to up-scale TME technology and SLM at the local level, and the mainstreaming of SLM concerns into on-the-ground investments in livestock management, and the development of incentives at the provincial level for sustained investments in SLM.

190. Within Outcome 1 the GEF alternative will support the decision-making process by politicians, breeders and scientists by completing baseline investments in GIS and DSS and by creating missing instruments, such as an early warning system and pasture monitoring system and the overall framework (or node) that connects these into a usable format and by providing equipment and training in the use of the information at the provincial level. The GEF increment will provide additional workshops, consulting by an expert in DSS, data management, and validation of the use of the system by the participants, in addition to basic equipment. A part-time area coordinator and a part time deputy director at the provincial level will be hired to mitigate the vast distances and lower travel costs. The information at regional scale will assist decision-making in processes such as policy planning and sustainability analysis of entire productive systems and ecological regions. The information will be shared through the Patagonia Network. The co-financing is oriented to the Patagonian Network REPAM (WM, FIDA, SAGPyA, SAyDS). Provinces will co-finance equipment, workshops and personnel to

aid in the development, data entry and operation of the DSS system, and INTA will provide images, processing, workshops, data management, and climatology infrastructure.

191. Within the scope of outcome 2, the GEF alternative will validate TME in various eco-regions and build local capacities to apply SLM in different ecosystems and production systems. The project will establish and strengthen organizational structures in conjunction the PRODERPA/IFAD initiative. The GEF contribution will establish a better baseline through a capacity deficit analysis of the grassroots groups and develop materials to facilitate access to for groups of producers to gain access to incentives for environmentally sound livestock management. In order to bring the family and the future generations of producers in line with the message, appropriate teaching materials will be produced in order to introduce the themes of desertification, SLM, and TME through the formal school system. Equipment will be added to facilitate contact with the largest number of groups possible to contribute to a key part of the scaling-up of the TME technology: the development of a participatory extension and technology transfer system (SITT). Co financing of these activities will be supported by: Provinces and INTA that will provide salaries for additional extension agents. The bilateral project IFAD/PRODERPA will provide funds for producer organizations and investments in business plans. The additional extension agents will work with PSA and Cambio Rural technicians to establish TME within the productive projects funded by provincial programs and the Sheep Law. Demonstrative model production areas will be established with productive investments financed by LO/SAGPyA and GEF-financed monitoring and demonstration activities.

192. Outcome 3 seeks with a GEF increment of \$443.470 to mainstream SLM into the process of approval of incentives, credits and subsidies of the projects in order to foment additional indirect global benefits. These funds are used to create protocols, train officials and decision-makers, unify range evaluation and planning methods across Patagonia. Total co-Financing: funds will be the main items in tax exemptions and credits of provincial laws, and money for PSA and IFAD projects. Other co-financers will be SAyDS and INTA that will be used in the harmonization process. The GEF alternative includes the LO on-the-ground investments as baseline.

193. Outcome 4 is developed to provide sound and adaptive learning to the GEF full project with financing replication costs and SAyDS financing salaries of administrative officers and logistic for the central GEF office in Buenos Aires.

194. The GEF alternative will result in a combination of local, national and additional indirect global benefits. Local benefits will be realized with the poverty reduction programs and the increase in organizational and planning abilities. Sustainable financing activities for SLM will also generate the expertise to finance a range of additional local development issues within the sector, thus contributing to the reduction of poverty in drought stricken areas. Through innovative structures, such as the creation of provincial tax incentives, the experience in generating local resources to finance and cover the recurrent costs of SLM will alleviate the present dependence on the Sheep Law. Although further work is necessary to correlate carbon capture and land degradation processes, preliminary work by INTA indicates what the indirect relationship might be. Poor management of these rangelands would induce a loss of 8.6 tonnes C/Ha. Maintenance of the range condition in 6M Ha would therefore avert the loss of 51.6 M

tonnes of C (see analysis in Section IV, Part III) in addition to reducing the pressure on sensitive and biodiversity rich dry ecosystems.

C. Summary of Costs

195. The total baseline estimate for the project is \$31,839,809. The GEF increment will cost \$31,134,421 that is comprised of the GEF grant of \$5,183,966 and co-financing that amounts to a total of \$26,570,455. The total GEF increment is \$31,754,421. The total GEF alternative is \$63,594,230. The development of the concept was contributed by UNDP and by national sources for a value of \$30,000 and the PDF-B grant by GEF is valued at \$350,000 elevating the full cost of the project to \$63,974,230. The co-financing ratio for the full project is 5.1:1 co-financing to GEF.

196. The amount of GEF funding requested for the full project exceeds the original estimate by \$183,966.

Table 5: Indicative Outputs, activities and working plan by semester

Outputs	Activities	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10
Output 1.1: Institutional access and inter-action catalyzed through the establishment and consolidation of the Patagonia network across 6 provinces and among national level institutions.	1.1.1. Establish inter-institutional agreements.	X									
	1.1.2. Develop and validate the strategic political framework for SLM in the Patagonia.	X	X					X			
	1.1.3. Design of the Patagonia network (REPAM) for SLM.	X	X								
	1.1.4. Deployment of the Patagonia network (REPAM) for SLM.	X	X	X	X	X	X	X	X	X	X
Output 1.2: Decision support system (DSS) completed, integrated and functioning within 6 provinces.	1.2.1. Integrate, link and complete the GIS for the SLM.	X	X	X	X	X	X	X	X	X	X
	1.2.2. Design and upgrade simulation models of productive systems.	X	X	X	X	X	X	X	X	X	X
	1.2.3. Strengthen, develop and implement environmental monitoring systems for the SLM.	X	X	X	X	X	X	X	X	X	X
	1.2.4. Strengthen, develop and implement early alert systems (snowfalls, droughts and fires).	X	X	X	X	X	X	X	X	X	X
	1.2.5. Verify DSS usage.					X				X	
Output 1.3: Public and private Institutional and NGO human resources capacity to implement SLM is fortified.	1.3.1. Technical assistance for the institutional re-organization and re-engineering.		X	X			X	X			
	1.3.2. Equip and develop human resources for the SLM management.	X	X	X	X	X	X	X	X	X	X
	1.3.3. Provide support to the institutional compatibility norms.			X	X			X	X		
Output 2.1: Organizational structures established and strengthened to increase participation and exchange of information between producers and programs.	2.1.1. Determine the DCI of the producers associations.	X	X							X	X
	2.1.2. Channel incentives, subsidies, and emergency or disaster resources through the producers associations.			X	X	X	X	X	X	X	X
	2.1.3. Strengthen leaderships		X	X				X	X		
	2.1.4. Empowerment of promoters		X	X				X	X		

Outputs	Activities	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10
Output 2.2: Integrated, participatory extension and technology transfer system (ITTS) for production information developed, implemented and accessed by producers	2.2.1 Integration and system design agreements.	X	X								
	2.2.2. System implementation and management.		X	X	X	X	X	X	X	X	X
	2.2.3. Field agents training			X	X	X	X	X	X	X	X
Output 2.3. Awareness and knowledge programme implemented for <u>large, medium and small breeders</u> on land degradation and SLM practices.	2.3.1. Reinforcement and updating of the environmental issues within the formal education system.			X	X	X	X	X	X	X	X
	2.3.2. Implement consciousness raising and sensitizing activities.		X	X	X	X	X	X	X	X	X
	2.3.3. Strengthen capacity-building systems for breeders.		X		X		X		X		X
Output 2.4. Awareness and knowledge programme implemented for <u>rural families</u> on the land degradation problems and SLM practices.	2.4.1. Implement consciousness raising and sensitizing activities with breeder's families.		X	X	X	X	X	X	X	X	X
	2.4.2. Courses and course materials			X		X		X		X	
Output 2.5. On-the-ground models for TME technologies validated.	2.5.1. Develop pilot projects in livestock pasture management and alternative employment in private lands.		X	X	X	X	X	X	X	X	X
	2.5.2. Monitoring and diffusion of the performed activities.		X	X	X	X	X	X	X	X	X
Output 2.6. On-the-ground models for conservation within private lands validated.	2.6.1. Design and development of on-farm models in range management and conservation on private lands.		X		X		X		X		X
Output 3.1. Norms that mainstream SLM into programs and projects are unified between agencies and projects.	3.1.1 Establish agreements between the programs.		X	X							
	3.1.2. Design, confirm and publish SLM guidelines.			X	X	X					
Output 3.2. Local experts, extension officers, and private consultants trained	3.2.1. Improve current methodologies of evaluation and performance of livestock pasture.		X	X							

Outputs	Activities	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10
and equipped to implement TME as an integral part of their programs and projects.	3.2.2. Capacity-building of technicians in integral planning of establishments.		X	X	X				X	X	
Output 3.3: Incentives for the application of SLM on rangelands and conservation alternatives on private lands developed.	3.3.1. Create incentives norms			X	X	X	X	X	X	X	X
	3.3.2. Support the management and control of mechanisms for the implementation of incentives.										
Output 4.1: Effective monitoring and evaluation implemented building on information from Outcome 1	4.1.1. Perform a mid-term and final evaluations of the Project, with recommendations for the SLM.					X					X
	4.1.2. Perform five partial evaluations and one final. These evaluations should be participative and should generate proposals that strengthen the use of the SLM.		X		X		X		X		X
Output 4.2: Adaptive management of project actions and resources based on M&E systems	4.2.1. Effective management of the project	X	X	X	X	X	X	X	X	X	X
	4.2.2. Dissemination and diffusion of the information.		X	X	X	X	X	X	X	X	X
Output 4.3: Lessons learnt through project actions on SLM in Patagonia and M&E is disseminated in Argentina and other arid and semi arid areas	4.3.1. Edit and publish a document with the most successful experiences to be used at national and international levels.								X	X	

SECTION III: TOTAL BUDGET AND WORKPLAN

AWARD: 00041209

AWARD TITLE: PIMS 2981/OP15/Sustainable Management of Arid and Semi Arid Ecosystems

PROJECT ID: 00046906

Project Objective:

Project Outcomes/Atlas Activity	Responsible Party	Source of Funds	PLANNED BUDGET & WORKPLAN					Total Amount
			2006 US\$	2007 US\$	2008 US\$	2009 US\$	2010 US\$	
Outcome 1: Capacities built in institutions and stakeholders to incorporate SLM concepts into decision-making processes	SA y DS	GEF	519,708	326,096	213,285	213,417	196,990	1,469,496
			519,708	326,096	213,285	213,417	196,990	1,469,496
Outcome 2: Local level producers have increased capacities to apply SLM in different ecosystems and livestock production systems			786,890	452,134	402,260	374,816	326,450	2,342,550
			786,890	452,134	402,260	374,816	326,450	2,342,550
Outcome 3: Livestock promotion and incentive programs and on-the-ground investments mainstream SLM in livestock pasture management and conservation alternative employment	SA y DS	GEF	81,585	144,394	86,905	69,901	60,685	443,470
			81,585	144,394	86,905	69,901	60,685	443,470
Outcome 4: Learning, and dissemination principles contribute to guide SLM in arid and semi-ecosystems and enable project adaptive management in Patagonia	SA y DS	GEF	203,580	140,340	159,320	150,480	274,730	928,450
	SA y DS	UNDP		50,000				
			203,580	190,340	159,320	150,480	274,730	978,450
		TOTAL TBWP	1,591,763	1,112,964	861,770	808,614	858,855	5,233,966

TOTAL by Source of Fund/Donor		2006	2007	2008	2009	2010	Total
	GEF	1,591,763	1,062,964	861,770	808,614	858,855	5,183,966
	SA y DS/GM	47,550	38,775	31,463	31,463	30,000	179,250
	FIDA	256,300	255,800	210,200	210,000	120,000	1,052,300
	SAGPyA	1,022,485	890,329	824,873	823,929	888,729	4,450,345
	SA y DS	28,956	26,600	26,544	25,800	25,800	133,700
	INTA	613,065	523,485	456,605	439,885	430,385	2,463,427
	Provincias	3,675,783	3,674,447	3,648,911	3,664,247	3,578,047	18,241,433
	UNDP		50,000				50,000
	Total Co-Finan	5,644,139	5,459,436	5,198,596	5,195,324	5,072,961	26,570,455
	Total (GEF+Co-Fin)	7,235,902	6,522,400	6,060,366	6,003,938	5,931,816	31,754,421
	GM	Project Prep. PDF-B	30,000				30,000
	GEF	PDF-B	350,000				350,000
	GRAND TOTAL	7,615,902	6,522,400	6,060,366	6,003,938	5,931,816	32,134,421

SECTION IV. ADDITIONAL INFORMATION

PART I. Other Agreements

1. Letters of Endorsement (attached below)
2. Letters of financial commitment will be added once the GEF Council has approved the project.

PART I #1. GEF Focal Point Endorsement Letter

PART II. Terms of Reference

This Part will be added after the GEF has approved the project, and before requesting CEO endorsement.

PART 111. Stakeholder Analysis and Participation Plan

197. Methods to assure stakeholder participation (see also PRODOC section II, part I) in the design of the project during the project design phase were implemented and with lessons learnt and stakeholder opinions were taken into account as follows:

198. Development of the UPP: The project preparation unit (UPP) was created as part of a participative process on 24 November 2004 by members of the livestock and environmental sectors from each of the six participating provinces, including specialists from the areas of ovine production, environmental management and experts in natural resources and sustainable management of arid zones in representation of partner agencies. The UPP is comprised of eleven permanent members and an Executive Secretary with one representative for each of the participating provinces and four technical specialists under the direction of a National Coordinator. The unit worked with ninety stakeholders from both the national and province levels linked through a network via e-mail, workshops, and presentations at the provincial level. As Patagonia is bigger than many GEF supported countries, it was vital to work through an additional 300 multipliers. All stakeholder representatives and multipliers received project materials, including a draft of the document and information as well as information necessary to understand the framework and operation of a GEF project, and the major counterpart projects: the sheep law, Patagonia XXI, PRODERPA, PRODESAR, LADA, the INTA Natural Resources Project, a summary of OP#15, and the approved concept. Key meetings were held at both levels to introduce the concepts and objectives of the project to national and provincial governments, public and private institutions, breeder organizations and NGOs. During these meetings participants commented on the action plan, elected the project steering committee, identified consultants, and selected key stakeholders for consultation.

199. Development of the CD: The project steering committee (CD) was created to incorporate the major strategic partners: (1) SAyDS with the Office of Soil Conservation and the Office for the Convention to the Combat against Desertification, the GEF focal point; (2) SAGPyA and its Sub-secretary for Agriculture, Livestock and Forestry, Coordinator for the LO (PDGOSP), (3) the rural development committee (CDR) which monitors all of the PSA/PROINDER/PRODERPA/CAMBIO RURAL/PROLANA/MOHAIR/CARNE OVINA projects implemented in the region. (4) representatives from INTA, PDGLS (Río Negro), and others such as SENASA, INAI (Indigenous groups), the Municipalities of Patagonia, MRECIC, PNUD, National Universities of Patagonia, RIOD-Patagonia, the scientific institutes of CONICET, Patagonian Parliament, PRODERPA-IFAD, WISP, COFEMA, LADA and representatives of large, small and medium producers (PyMES). Within the CD, Government representatives at the Secretary level developed a general strategy and signed a Memorandum of Understanding. Based on lessons learnt, they expressed that the project should have a *holistic vision*. The representatives of the indigenous producers were elected in an assembly of representatives from their districts. The representatives of the small producers were incorporated from the “Southern front” Line of Río Negro’s ENTE. The medium and large ovine producers were elected by their rural associations (in Tierra de Fuego, S. Cruz, Chubut and Río Negro).

200. Meetings with the Associations of Breeders and National Organizations: Five presentations were given during provincial meetings of rural associations during which breeders were introduced to the project and its connection with the LO, and mechanisms, and where they expressed their concerns for credits or developmental research. Meetings were

held with the members of the Rural Societies of the South, the Federation of Rural Societies of Chubut and Santa Cruz, the Sub-secretary of Livestock in the SAGPyA and the President of INTA to delineate the rangeland evaluation process as established in article 3 of the LO that mandates the generation of maps that depicts resources available by province and by region. INTA was awarded the task for completion and charged with the duty of establishing the nexuses and articulation of each one of the three methods for the natural pasture evaluation that have been implemented in Patagonia for the past several years.

201. Meetings with GEF and IFAD: There was also one meeting with the GEF representatives in addition to the continued interaction with all of the GEF contacts in the national territory relative to the national staff as represented in the thematic table (Table 6). A Memorandum of Understanding was signed that identifies the applications and possibilities between the distinctive interventions in the country and in agreement with the agenda of the national meetings. The possible interaction with IFAD-GEF was discussed with the representatives of IFAD-ROMA with both projects being approved. Two national meetings were held with the representatives of IFAD-PRODERPA of the SAGPyA.

202. Meetings with the Patagonian Parliament and the Commission on the Environmental Agenda: A verbal agreement was reached to promote a motion during the next meeting of Parliament session that would declare the project as an interest to Patagonia. The Patagonian Parliament is an organization made up of legislators from the six provinces and is a vehicle for accessing public policymakers on the topic of land degradation and sustainable management. The parliament meets periodically in each province and is structurally connected to the Environmental Agenda. The Environmental Agenda is a forum in which future policy frameworks are established on the regional level and are aligned with the national agenda. In this phase, the objective of the project has been to draw together the various aspects of ovine production to the Agenda and create a vision that united the breeders with the environment. One presentation was delivered during a meeting of governors during the inauguration of the Environmental Agenda in Puerto Madryn in December 2004

203. Meetings with national, provincial, technical and political entities: Meetings were held with INTA's national staff and with CONAE. The meeting facilitated contacts between the SAyDS, the SAGPyA and INTA at the level of sub-secretaries and the president. A presentation was given before the NAP in which the needs and expectations of the project partners were expressed. The meeting also tried to identify complementary and similar experiences in other initiatives in arid and semi-arid areas around Patagonia. The Project was also delivered to staff of each of the six provinces. These meetings included the participation of the directors of the under-secretaries of environment, ovine production, protected areas, planning, education, UEPs of the LO, legislators province consultants and in some cases citizen groups from the provinces. The representatives to these meetings, similar to the province consultants, were elected by each participating province. The purpose of these meetings was to facilitate participation and provide a forum for exchanging expectations of the project, and based-on the perceived roles of the participants and their benefits and obligations. The result was increased mobilization for this stage of the Project in key areas of the province governments. An additional meeting to establish official contact with the CDR of the SAGPyA resulted in the coordination mechanism between the CDR and the GEF Coordinators and the projects under SAGPyA administration, such as PROINDER, PSA, CAMBIO RURAL, PROFAM, PRODERPA, PROLANA, CARNE OVINA. It also achieved an agreement to efficiently use existing networks and processes for project implementation and created a line of communication between CDR and the project staff. Additional

agreements include: (1) an INAI (SAyDS) agreement that defined indigenous representation on the CD and (2) with the Director of Soil Conservation in the SAyDS to establish political and organizational frameworks for the project at the national and province level, in addition to meetings with the PNUD, GTZ and MRECIC.

204. Provincial Consultants and interaction: To gain greater access to the grass roots, a provincial level consultant was contracted by each province for the period of three months. These consultants helped connect province concerns with the national consultants, acquired documents, highlighted drafts of the province and legislative provincements of interest. They also planned meetings with breeders, policymakers and province level technical specialists. These consultants had direct contact with the National Coordinator. Two workshops were held in Patagonia to align knowledge and expectations, obtain the basic elements of the Logical Framework, and determine the baseline data and incremental costs. The workshops included all the members of the UPP, the Project Director (Under-secretary of the SAyDS), various national consultants, INTA, province level consultants, Under-secretariat of SAGPyA, SAyDS, MRECIC, two representatives from each province, and various development and scientific specialists. The second workshop enabled dialogue on the design of the project and the logframe including the framing of several agreements with provincial commissions. Based on those interactions, the systems boundary of the project was reduced to limit actions to the livestock sector and changed to have a more holistic approach that encompasses issues relating to small breeders, poverty and the concept of gender. A note from the Secretary of SAyDS was distributed to the Ministers of Production in the six provinces in order to solicit the revision and approval of the Logframe. In June of 2005, the project was officially presented to be recognized and supported by Patagonian Parliamentary Law during the next meeting of the Environmental Agenda.

205. Diffusion and Communication: Project information has been disseminated through television and radio spots and printed media. A website was also setup with all of the most important documents and meetings. Copies of a booklet (3,000) and murals were widely distributed to potential beneficiaries. At least two governors (from Chubut and Tierra del Fuego), two Ministers of Livestock, four from the Secretaries and various directors presented the Project in public meetings.

206. In addition to the participatory processes mentioned above, the views and opinions of the beneficiaries have been logged since 1989 by several national and international initiatives and events. The project design team reviewed the information and stakeholder inputs from the records from the following projects and events.

- PRODESAR (INTA-GTZ) 1989 – 2003
- LUDEPA-SME (GTZ) 1990-1992
- Workshop On International Desertification – Rio Gallegos 1994
- Regional Decision Support Systems 1997
- National Action Plan (NAP) 1997
- DHV Consultants Report 1999
- Program For The Developments of Sustainable Livestock Production (Law 25.422)

Mechanisms and Strategies to Promote Stakeholder Participation

207. The same mechanisms mentioned above for the design of the project will continue during implementation of the project. During project implementation, additional formal

structures are considered to overcome the great distances in the Patagonia region and the negative effect of those distances on participation especially at the grassroots level.

208. Patagonia has multiple programs and projects with structures for communication, information and management at both the province and community levels for many of the major initiatives (see baseline analysis). The project seeks to take advantage of these existing structures and networks and use them as “nodes” and connect them with project information and services through the Patagonia Network (REPAM) (output 1.1). Within REPAM, existing structures will be strengthened to interact within the network and capacity building actions will facilitate the effective and productive participation within the network (outputs 1.3, 2.1, and 2.3). The network will serve as a forum that will be of particular interest to the interests of the smaller, more remote pastoralists. To create access for that group, improvements in social capital will be made through the PRODERPA (IFAD) and the PSA project. Within that initiative, cooperatives will be strengthened. Once breeders are connected to a cooperative, they will have access to a paid (government) technician that will have received training in TME technology, is authorized to request incentives and complete environmental evaluations, and is connected to the Networks information and services. In addition, the administration of said cooperative should also be using the Network to respond to surveys and to express the interests of the members of the cooperative within that forum. The same opportunities will be available for the Rural Societies, which are federation of mid size and large producers.

209. The project will use existing structures that have multi-level communication both upstream and downstream (See Part I. Institutional, Sector and Policy context). The project will operate closely with a regional production and environment network orientated to perform actions to combat desertification. In this sense, decision making and information will flow upstream and downstream involving the SAyDS and the “Team for the fight against desertification”, the Board of Directors for NAP; and SAGPyA including its CDR, that includes most of the large sector development projects under its umbrella. CDRs board oversees implementation of the Cambio Rural and the PROINDER initiatives and will soon coordinate the PRODERPA project. The Executive Planning Unit or (UEP) is comprised of the provincial Secretariat of agriculture, private producers and SAGPyA (INTA).

210. The connection of the small producers is slightly different than the mid or large size producers. The small producers are individualists that often work in very remote areas. They connect to associations or single interest groups operating at the grassroots level. Associations are grouped into cooperatives where the association leaders will receive information on programs, policies, and technical assistance from a technician financed by PSA or PROINDER. Cooperatives are grouped into federations that are even more technically qualified to mobilize resources. GEF funding will complete a DCI analysis of these 3 strata and share that information with PSA, PROINDER, and the PRODERPA project as soon as it is on-line. The full project will support training and technical assistance measures to enhance the participation, connectivity, and effective lobby of these stakeholders (output 2.1) to complement the co-financed organizational development efforts. The target population of PRODERPA/IFAD will be poor rural producers, mainly youngsters and women, including aboriginal communities “mapuches” and “tehuelches” and its general objective is to enhance their organizational capacities through organization and self-sufficiency. An additional participation mechanism for this group is the Patagonian Rural Development Forum . The forum that would articulate a debate and generation of rural development policies and poverty reduction space with participation of central and provincial

governments, rural producers, ONGs and civil society organizations, universities and the business sector. It was originally conceptualized for the PROINDER project but unimplemented. The GEF investments in the Patagonian Network will make the forum operational.

211. The mid and large scale producers are grouped in to Rural Societies (*Sociedades Rurales*) that follow the same hierarchal structure and connect to second tier federations. Although they are recognized as being more technically adept, a DCI analysis does not exist to confirm their pre-training status. A DCI analysis at inception will determine the training plan for these groups.

212. Special activities are oriented towards the political sector and the policy makers. Primarily, the mentioned network will put them in touch with other stakeholders and their ideas as part of the lobby. Second, the tools produced will benefit the offices and staff of congressional decision-makers in each province, and third, consciousness raising activities will bring the legislators closer to taking a landscape based approach to sustainable development. With the purpose of mainstream the environmental component and inputs of the SLM, this Forum will be used as a mechanism to assure the participation of a larger stakeholders spectrum, such as associations and confederations of big and small producers, small producers considered within the structures of PSA and PRODERPA/IFAD and the INTA and other provincial organisms that already have a consolidated extended structure.

213. The needs of a cadre of institutional stakeholders, such as the Sheep Law UEPs , INTA and their programs, and the CDR among others, will be met by utilizing common coordination structures that are also designed to stimulate participation. The Sheep Law's UEP and the CDR are examples that will have a double impact on managing regional development and on reaching a larger spectrum of stakeholders. Decision-making on project processes utilizing the information from programmatic evaluations will be discussed within this forum and will also be presented from within the network. Users will have a forum for expressing opinions on what recommendations to adopt or reject, in addition to participating in debates over project re-engineering following evaluations (Outcome 4).

214. Another structure, complimentary to REPAM, but in the technical scope, would be the SITT. This system would be the means of harmonizing the technologies (like the TME) existing in the multiple projects and programs in development throughout the region. The consolidation of different organisms with extension and transfer structures, that will make this structure a participative "node" to unify SLM technical criteria with which reach the producers inserted as direct beneficiaries of the REPAM

215. This mechanism for stakeholder participation will serve also to create awareness of those aspects that make under the care of the structure, integrity and functions of the ecosystems by introducing SLM concepts in a transversal manner in the intervention Projects and Programs currently on the way and in those that will potentially initiate and finance.

216. The CD of the Project will be in charge of inter-institutional relationships, consensus and diffusion of the actions to the highest political levels. It will be the consultative structure of the Project where the stakeholders will participate. Likewise, it will be the instance where beneficiaries demand and project policies and activities will be integrated. Its main objective will be to provide guidance for the management of the Project and the Execution Unit of the Project, specifying commitments specially referred to the expected co-financing during its

development. The identification of opportunities of integration and alliances will serve to facilitate contacts of the Execution Unit with Provincial Governments and the Network: The UEP of the LO, the producers, sectors of CyT like the INTA and Universities and Institutes, National Projects like NAP, GEF, PRODERPA, LADA and Programs like CAMBIO RURAL, PSA, PDGRS (ENTE de la Línea Sur de Río Negro), PROLANA, CARNE OVINA, PROINDER, CAMBIO RURAL, MINIFUNDIOS, MOHAIR, and others. The CDR shall have a seat in the CD, and at the same time, this GEF shall have a seat in the CDR.

Table 6. Stakeholders Identification and Involvement during Project implementation phase

Category	Function	Represented by	Level of Involvement
International Level			
UNDP	Implementing Agency	United Nations	Regional Coordination of the project designs and develops links with other international projects.
FAO	Sustainable live-stock farming	Regional Group of Pasturing Systems, Patagonia Argentine/Chilean and LADA	Financing SLM initiatives in natural livestock pasture in South Patagonia, Argentine/Chilean and of LADA Project in Patagonia
IFAD	Co-financer and Co-executor for development and the fight against poverty in Patagonia	PRODERPA. Argentine Representative (SAGPyA)	Financing activities for small Patagonian producers and strengthens organizational capacities. Shares management structures in 4 of the 6 Patagonian Provinces
GTZ	Technical assistance	Argentine representative	Develops a Monitoring system of the National PAN. Assists in publishing dissemination materials on environmental education
LADA	Detects social, environmental and economic desertification indicators	FAO/SAyDS	Finances areas of study in Patagonia (Jacobacci y Cushamen) in <i>hot and bright spot</i> .
National Level			
UNDP	Project National Implementation Agency	United Nations	Supports the execution of the Project. Financing and Part of the CD
IFAD/SAGPyA	PRODERPA participating agency.	SAGPyA and Patagonian Provinces	National Coordination of IFAD Project. Vehicle in assisting Small Producers. Part of the CD
LADA/SAyDS	Project Implementing Agency	SAyDS and Patagonian Provinces	National Coordination of GEF Project. Finances common works on indicators. Part of the CD

SayDS	National Direction of the Project	SAYDS Under-secretariat	Responsible of the GEF Project at a national level as a political focal point. Financing and Part of the CD
SAGPyA	Sheep Law Coordination	Livestock under-secretariat (under-ministry)	Responsible for the activities of the development sheep livestock program and the credits and subsidies approval. Part of the CD
MINISTRY OF FOREIGN AFFAIRS, INTERNATIONAL COMMERCE AND WORSHIP	GEF and Desertification focal point	Minister	Responsible for the international connection of the Project. Part of the CD
STEERING COMMITTEE	Management of the Project	All related organisms, public and private.	Implements policies, consensus and links of the Project with the different actors (stakeholders) that conform the REPAM
CDR Rural Development Commission (Cambio Rural, PSA, PROINDER, PRODERPA, INTA-SAGPyA programs)	Coordinate programs	Coordinator	Implements action criteria homogeneity. Exchange and dialogue concentration. Offers conveyance spaces in common structures. Information that should reach producers vehicle. Financing common activities towards small producers, extensions, publications and training. Part of CD.
DNDA - SAGPyA.	Coordinates activities with PROINDER. Coordinates agricultural emergencies (indigenous, women)	Coordinator	Coordinate rural development, socioeconomic and production works
INTA	Generation, validation and transfer of cattle technology	National Director National and Regional Directors of South and North Patagonia.	Improvement of production systems and SLM practices. Financing and Part of the CD. Participation in SITT, training in TME, DSS
SENASA	Promotes sanitary norms and food quality	National Director	Prosecution of quality norms in products obtained through the activity. Eco-Certification. Part of the CD

NATIONAL PARKS MANAGEMENT and SAyDS	Management of native forests.	Director	Fire Control and prevention, forests control and regulations. Technical training. Part of the CD
INAI - SAyDS	Promotion of co-financing for the development and fight against poverty in native towns.	Director	Implements policies, consensus and links between civil society and governments with indigenous towns. Part of the CD
RIOD (ONG Networks)	Promotion of environmental sustainability	Patagonia Nature Foundation	Education, training and negotiation for implementing SLM. Member of the CD
BIG AND MID SIZE PRODUCERS	Steppe breeding of sheep, caprine and bovine cattle.	Rural societies	Management and improvement of productive systems through SLM. CD member
SMALL PRODUCERS	Caprine (Goat) and Ovine (Sheep) cattle breeding.	Cooperatives, Development entities	Management of productive systems with SLM. CD member.
RURAL SOCIETY/CRA	Producers' representatives by associations.	Presidents	Information dissemination and program access. Way of communication of Meta Groups (big and PyMES) with the Project. Linkage with Network. Part of the CD
Provincial Level			
ENVIRONMENT SECRETARIAT	Coordinate the implementation of development policies and environmental regulations in its territory	Under secretariat or Director and COFEMA	Support execution of the project (legislation reinforcement, methods, local coordination). CD member..
PRODUCTION MINISTRY	Coordinates the implementation of productive development policies	Under ministry or Director	Supports execution of the Project (Coordinates with UEPs of Sheep Law and with the environmental office) CD member.
Sheep Law - UEP	Coordinates the implementation of the LO activities	Producers; Province; INTA.	Credits and subsidies control, and compliance with the LO Art. 3. Focal point for diffusion of the Project in each province.

PATAGONIAN PARLIAMENT	Promotes the Patagonian Environmental Agenda	President of the Parliament	Supports provincial norms and legislation and consensus between the provinces. Statements of legislative interest. CD member
PROVINCIAL LEGISLATORS	Promotes necessary legislation to promote planning in arid zones.	Legislators of the six provinces.	Supports SLM activities, control, planning and sustainable development
NATIONAL UNIVERSITIES WITHIN REGIONAL SCOPE	Promotes investigation and investigation extension on livestock pasture, natural resources, socio-economy.	Natural Science studies Deans	Support Project financing and generation, validation and transfer of technology. Statements of academic interest. CD member.
DEVELOPMENT ENTITY OF THE SOUTH REGION	Producers representatives and small land owners	Director	Dissemination of information and access to programs. Way of communication of Meta group (big and PyMES) with the project. Linkage to Network. CD member
RURAL SOCIETIES FEDERATIONS	Representatives of big producers and PyMES.	Presidents	Vehicle to reach producers with information and training
COOPERATIVES FEDERATIONS	Small producers representatives	President	Vehicle to reach producers with information and training. Small producers have difficulties to join LO

PART 1V: Data on the socio-economic and environmental conditions in the project area.

217. The Patagonia is a vast region (780.000 km²) covering a wide latitudinal range (36° to 55° S). It is limited to the West (W) the Andes and to the East (E) by the Atlantic Ocean, and stretches from the Barrancas – Colorado Rivers to the Magellan Strait. The geographic limits of the project include the provinces of Neuquén, Rio Negro, Chubut, and Santa Cruz. The geographic limits of the project include the provinces of Neuquen, Rio Negro, Chubut, and Santa Cruz. In addition, the province of La Pampa and the Argentine territory within the island of Tierra del Fuego corresponding to the province of Tierra del Fuego, Antartica, and the South Atlantic Islands (maps 1 and 2).

Agro-ecology

218. Patagonia comprises 3 distinct ecosystems: the mountainous **Andean Region**, where the climate is humid, the **Irrigated Valleys** and the **Arid Region**, which comprise mountains, plateaus and plains and has a semi-arid to arid climate (maps 5 and 6). The **Andean region** of Patagonia lies within the Sub-Antarctic Phyto-geographic Province (Cabrera, 1971), is penetrated at its highest altitudes by the High Andean Province (at over 1.700 m. above sea level in northern Neuquén and 400 m above sea level in Tierra del Fuego), and has an extensive ecotone with the Patagonian Province. The **Arid** Patagonian region belongs to the Patagonian and Monte Phytogeographic Provinces (Cabrera, 1971; León et al., 1998). The latter covers about 25 % of the region, in the north-east. The transition between phyto-geographic provinces is caused by the temperature regime: mean annual temperature is 8 to 10°C in the Patagonian Phyto-geographic Province, while in the Monte Phyto-geographic Province it is 14 to 16°C. Intensive farming is concentrated in the **Irrigated Valleys**. The main valleys are: Alto Valle de Río Negro y Neuquén, Valle Medio del Río Negro, Valle Inferior del Río Negro, Valle del Río Colorado, Valle de General Conesa, Valle Medio e Inferior del Río Chubut, Valle de Genoa, Comarca de Los Alerces, Colonia Sarmiento, Comarca N.O. de Santa Cruz and Gobernador Gregores.

219. The Patagonian **climate** is mainly dominated by air masses from the Pacific (Paruelo et al., 1998), generating a Mediterranean type rainfall pattern (winter rainy season). In northeast Patagonia and the southern tip of Patagonia the climate is also affected by the Atlantic Ocean, and there is no definite yearly rainfall pattern. Annual rainfall varies from over 2000 mm in some parts of the Andean Region to less than 200 mm in the centre of the Arid Region. With the exception of the Monte sector, mean annual temperatures are below 10°C.

220. In the Andean region, the predominant **soils** are moderately developed from volcanic ash and eolian sands, moderately deep to deep, of medium textures, with a good supply of superficial organic matter, with no or slight summer water deficit, belonging to the orders Andisols and Mollisols. In the arid region, the predominant soils are developed from sediments originating from weathering and transport of pre-existing rock, moderately deep to deep, moderately to highly developed, with medium to fine textures, usually containing carbonates in the profile, very little organic matter and a medium to strong annual water deficit, corresponding to the order Andisols. They are associated with sandy-textured, poorly developed, moderately deep to very

deep soils containing very little organic matter at the surface and moderate to high annual water deficit, corresponding to the order Entisols (INTA/CIRN 1990).

Carbon Capture estimates for Patagonian Ecosystems

221. To estimate the total carbon fixation we estimated cover of a Magellanic tussock steppe and a dwarf shrubland, in south Patagonia (Oliva, unpublished). Overgrazing produces transitions between these two states (Oliva et al 1998). Carbon in plants and soil was analyzed for each of the main life forms and their values calculated on a per Ha. basis (Peri y Lasagno, 2005, *com, pers.*). These results indicate that poor management of these rangelands would induce a loss of 8.6 tonnes of C/ha. Maintenance of range condition in 6 M ha would avoid the loss of 51.6 M tons of C.

Table 7. Vegetation Cover and C fixation comparison between good and bad condition grasslands in the Magellanic steppe (Peri y Lasagno, 2005, *com, pers*)

	Tussock grassland (good condition)	Dwarf shrubland (bad condition)
Bare ground and litter	14,89	18,3
Vegetation cover (%)	85,2	63,7
Herbaceous dicots (%)	9,17	1,2
Short grasses (%)	29,1	30
Tussocks (%)	28	3,34
Dwarf shrubs (%)	10,8	17,7
Species richness	27	19
Shanon Wiener diversity index	-2,2	-1,67
C in plants (tons/ha)	2.3	2.6
C in soil (tons/ha)	29.6	20.7
Total C (tons/ha)	31.9	23.3
C loss (tons/ha)		8,6
Total loss avoided in 6 M ha (M tons)		51,6

To estimate the total carbon fixation, INTA

Water Resources

222. There are 4 large basins in Patagonia, which arise in the Andes Mountain Range and flow into the Atlantic Ocean: the Colorado, Negro, Chubut and Santa Cruz basins. The most important is Río Negro, which flows through one of Argentina's major irrigated valleys. It is followed in size by Río Colorado and Río Chubut, which also flow through irrigated valleys. It is worth noting that these valleys lie in the area corresponding to the Monte Phytogeographic Province. In addition, some of these rivers, mainly Río Limay, are one of Argentina's main sources of hydroelectric power.

223. The upper basins of these rivers are located in the Andes Cordillera Region with about 40% of this region draining into the Pacific (basins of the Río Manso, Río Futaleufú and Río Corcovado, and the lakes Lacar, Buenos Aires, Pueyrredón and San Martín, among others). In turn, about half the Patagonian territory is occupied by endorheic basins that drain into temporary ponds. Much of the superficial drainage of arid Patagonia (except for the part covered

by Monte) flows down gently sloping valleys, producing meadows “mallines” or , azonal environments that are productively and environmentally important.

Ecological regions of Patagonia

224. Patagonia is highly heterogeneous from a natural point of view, mainly due to the rainfall and temperature gradients in the area. Rainfall varies longitudinally: it is plentiful near the Chilean border, decreases rapidly eastwards, stabilizes in the centre and increases slightly again towards the Atlantic Ocean and the southern tip of Santa Cruz. The temperature gradient is related to elevation, with lower temperatures at greater heights, and to a lesser extent related to latitude. In addition to these gradients, the area’s geomorphologic complexity determines different types of soils and drainage systems. To facilitate the systematization and synthesis of this heterogeneity in Patagonia’s natural resources, which support present and potential agricultural production activities, the area has been divided into Homogeneous Ecological Regions (HER) (Map 4).

Socio-economic description

Population

225. With its 1.738.251 inhabitants, Patagonia is one of Argentina’s most active eco-regions regarding the regions constantly increasing population growth. This distribution and dynamism is not homogeneous over the entire eco-region, but occurs mainly where the population is concentrated: in the mountains, on the coast (where 4 of the 5 provincial capitals are located) and in the irrigated areas of the large valleys in Río Negro and Chubut (such as Alto Valle del Río Negro, where almost one third of the total population lives). The rest of the territory is almost uninhabited, except for small, isolated pockets in small valleys or economic enclaves often unconnected to farming. The most rapidly growing districts are located on the edges of the region, associated to processes of economic activity which are also driven by tourism on the coast or in the mountains, and hydrocarbons. Meanwhile, in the interior of the arid Patagonia, most districts grow very slowly, with some of them even undergoing acute processes of depopulation.

Rural and Urban Population

226. Of the total population, 88% is urban and 12% is rural, with 6% living in rural settlements, while 7% are scattered. Rural population is declining in absolute terms, having dropped by 11% over the ten years between the last two populations censuses. The decline in rural population in arid Patagonia is related to the slump in sheep farming over the past decades. Exceptions to the situation are a few farms and settlements near tourist centres, which have been able to maintain some activity. Within this context of low density, in northern Patagonia there are a large number of peasant farmer families, which increase the figures. Alto Valle del Río Negro and the mountain valleys clearly stand out as having higher rural population density due to the more intensive productive activities.

Poverty

227. Regarding Unmet Basic Needs (UBN) in the region, Río Negro is the province in worst condition, with a UBN value higher than the national mean. It is followed by Neuquén and Chubut, while Santa Cruz is in a better position. Some districts in the arid part of Chubut and the northern Patagonian provinces, where peasant farmer families live, have the worst figures in Argentina.

Infrastructure and services

228. The distribution of services and infrastructure is closely linked to population distribution and government policies. Thus, it may be said that the greater the population, the higher the density of the infrastructure network.

Transport and communications

229. Transport and communications systems in Patagonia are oriented north-south, longitudinally connecting the coastal area on the one hand and the mountain area on the other. In contrast, there is poor communication in the central area of arid Patagonia, where the networks are poorly maintained. Railways follow the same pattern (in northern Patagonia only), as does air transport both for passengers and cargo. Within this general framework, Valle del Río Negro stands out due to its east-west orientation between Viedma and Neuquén with a dense transport and communications network. There are several ports on the Patagonian coast, the main ones being San Antonio Oeste, which is relevant to fruit exports, Puerto Madryn, Comodoro Rivadavia, Caleta Olivia and Ushuaia. This layout, which centres on the Pampa Húmeda and Buenos Aires City, matches the current model for national development.

Power grids

230. The main power grids start at the production centres (hydrocarbon or hydroelectric), located mainly in arid Patagonia, and lead to Buenos Aires, the hub that concentrates consumption, since Patagonia's electricity generating capacity amply exceeds regional demand. Internal power distribution grids are gradually being extended to towns and villages in the interior and the mountains, following the same pattern as roads. In rural areas, electricity is only available in some valleys. Firewood is widely used for heating and cooking among the rural population and a lot of the poor urban population throughout the eco-region. This widespread use of firewood has a heavy impact on some mountain forests and the thickets in arid Patagonia.

Education

231. In the provincial capitals and large cities within the three agro-ecosystems, education is widely available at its four levels, with various alternatives, and there are a large number of tertiary level educational establishments offering training for skills providing immediate job opportunities. Patagonia has three national universities: Universidad Nacional del Comahue, San Juan Bosco and Patagonia Austral (each with its regional seats) and private universities. In contrast, the small towns of the interior only have primary and secondary educational institutions; therefore people need to migrate towards educational facilities. In the rural area, there are schools and school residences, boarding schools, school villages and subsidized transport.

Health

232. High complexity medical facilities are also concentrated in the large cities. The rest of the towns only have local hospitals providing limited services. The number of physicians per inhabitant is low for Patagonia in general, except in the most densely populated, irrigated zone of Alto Valle del Río Negro.

Regional science and technical system in the farming sector

233. INTA plays a major part in the development of knowledge and technology for the farming sector, sharing some lines of research and experimentation with provincial entities, national entities and the national universities Universidad Nacional del Comahue, de la Patagonia San Juan Bosco and Patagonia Austral, as well as some private universities. Responsibility for extension and transfer lies mainly with the official entities (INTA, provincial governments, SAGPyA, CIEFAP, CADIC, CENPAT, and universities) since there is only private activity in areas where production is more concentrated. Medium and large businesses in the fruit and vegetable agro-industrial sector of Valle del Río Negro develop some of their own processes as well as processes linked to applied research on specific subjects of their interest. Within that context they also provide technical assistance to their clients.

Regional economy

Gross geographic product (GGP)

234. From 1995 to 2000 there was an increase in the national participation of the region's Gross Geographical Product (GGP). The nominal value of GGP and its structure regarding the participation of each sector has undergone significant change in favour of the primary sector after the 2001 devaluation, driven mainly by farming in La Pampa and oil, gas and their derivatives, which maintain international level prices, in the other Provinces.

Table 8: Regional Gross Geographic Product

	La Pampa	Neuquén	Río Negro	Chubut	Santa Cruz	Tierra del Fuego	Argentina
GDP (million pesos) ⁽¹⁾							279.020
Primary Sector ⁽²⁾ (%)	22%	34%	11%	19%	50%	20%	7%
Secondary Sector (%)	15%	11%	24%	21%	10%	33%	25%
Tertiary Sector (%)	63%	55%	65%	60%	40%	47%	68%
GGP / GDP Argentina (%)	1,2%	1.9%	1.5%	1,33%	1.5%	1%	100%

(1) GDP at market prices for 2003 for La Pampa and 2004 for the rest of the provinces, expressed in 1993 pesos.

(2) Except for La Pampa, Includes fuel and power

Sources: Dirección Nacional de Programación Económica Regional. April 2005

Dirección Nacional de Cuentas Nacionales – INDEC April 2005. Government of La Pampa 2005.

235. Within the regional GGP, the most relevant activities are oil and gas drilling and the electricity sector, which is made up of hydraulic and thermal (gas) power. Together, they make up the greater part of the GGP in the Patagonian region.

236. The economic changes resulting from the 2001 crisis have had a favourable impact on farming and forestry in the region, particularly on production linked to export. This change has reversed the negative trend of the 90s for most regional production. The following chart illustrates the comparative importance of the primary production sectors (gross product generated).

Table 9: Participation of the primary sector in the provincial GGP

	Agriculture, livestock, hunting and silviculture	Fishing
La Pampa	18%	N/I
Chubut	2.3%	3.1%
Neuquén	1.9%	0.0%
Río Negro	9.4%	0.2%
Santa Cruz	1.9%	7.0%
Tierra del Fuego	0.6%	2.8%

Source: Dirección Nacional de Cuentas Nacionales – INDEC April 2005. Government of La Pampa 2005

The industrial sector

237. The main industries are located on the Atlantic coast (Comodoro Rivadavia, Caleta Olivia, Puerto Madryn, San Antonio Oeste, Trelew and Ushuaia) and in the towns located in Valle del Río Negro. The main industrial activities are: production of oil drilling and distilling equipment, aluminium and derivatives, heavy water, electric appliances and ceramics, fish processing, juices (apple and pear), washing and combing of animal fibres (wool and hair) and meat packing plants for exporting lamb and mutton. In La Pampa, the main industries belong to the “food and beverage” sub sector, followed in significantly lower proportion by non-metal minerals, chemicals, publishing and printing and other smaller industries.

The service sector

238. The service sector is less important in this eco-region than it is in other regions of Argentina. The most relevant activities are public administration, tourism, business and communications. These activities are located mainly in the mountainous areas of all the provinces (connected to services for tourism), on the Atlantic coast (connected to provincial capital cities and, to a lesser extent, tourism) and in Valle de Río Negro (services for fruit production). Tourism has significant participation in the regional economic structure, and has undergone an upsurge in investment and level of activity as from 2001, with potential for even greater growth. In La Pampa, over 70% of the active population work in the service sector, mainly “Social Services” (company, social and health), followed by Business and Financial Services.

Farming

239. Farming takes place over the entire eco-region, with certain trends or specializations according to the different ecosystems. The fruit and vegetable producing areas are located in Valle de Río Negro, Valle Inferior del Río Chubut, the mountain valleys produce berries in a few small scattered valleys within the arid ecological areas. Livestock is raised in all areas, with sheep farmed mainly in arid Patagonia, more densely in southern Patagonia and sharing some areas with goats in the north and cattle in La Pampa. *Criollo* goats are farmed extensively in the mountains of northern Neuquén and western La Pampa, while Angora goats predominate from the centre of Neuquén to Chubut. Cattle are raised mainly in northeast Río Negro and La Pampa, as well as in pockets in the mountain range and sub-Andean grasslands and valleys scattered over the entire ecoregion. Livestock is fattened in northeast La Pampa, an activity that is leading towards full cycle livestock production. Forestry, mostly softwood and native hardwoods, is located mainly in the mountain and sub-Andean grasslands, while Salicaceae are grown in Valle del Río Negro.

Agriculture

240. Total cultivated surface area in the eco-region was 220,000 hectares in 2002. Fruit is the main produce, although it has lower relative participation and the surface area has declined in absolute terms. Fodder is also grown for livestock. Agriculture is carried out mainly in irrigated valleys and mountain valleys. There is no limitation as yet regarding land for expansion of the agricultural frontier in the region. Infrastructure for irrigation is available in the valleys of the rivers Negro, Neuquén, Limay, Colorado, Chubut, Sarmiento, Los Antiguos, Perito Moreno, Gobernador Gregores and Valcheta. With the exception of Alto Valle del Río Negro, most of the cultivated land is dedicated to fodder production and, to a lesser extent, fruit and vegetables. Agriculture and livestock contributes most to the economy of La Pampa.

Livestock

241. Livestock-rearing in the region is estimated at 8.2 million head of sheep, distributed over the entire Patagonia, with greater concentration towards the south, 0.9 million head of cattle located mainly in Río Negro, and 0.9 million goats in Neuquén and Río Negro.

Table 10: Livestock per Patagonian province (number of head per species).

Province	Sheep	Cattle	Goats
La Pampa	205.192	3.690.981	141.253
Neuquén	165.498	146.337	678.321
Río Negro	1.509.867	538.142	176.164
Chubut	3.890.104	131.222	96.000
Santa Cruz	2.165.403	55.061	
Tierra del Fuego	522.276	29.038	

Source: CNA 2002

Exports

242. In relative aggregate terms, exports of the Farming, Agrifood and Agroindustrial Sector (SAAA) made up 23% of the region's total exports in 2003. In 2002, fishing made up 55% of a total US\$ 722 million. Fruit production made up 30%, mainly with fresh pears and apples, dried fruit and concentrated fruit juice. Wool worth a total US\$ 100 million was exported, representing 14% of total SAAA exports. Exports of lamb and mutton are also on the rise. The structure of exports varies widely among provinces.

Table 11: Total exports from Patagonia in 2003.

	La Pampa	Neuquén	Río Negro	Chubut	Santa Cruz	Tierra del Fuego	Region
Total exports (thousand US\$)	160.000	983.154	334.263	1.266.000	964.000	265.800	3.813.217
Fuel and power	94%	94%	33%	48%	58%	94%	67%
Primary products	80%	3%	52%	16%	10%		13%
Manufactured farm products	3%	3%	10%	10%	32%		10%
Manufactured industrial products	1%		5%	26%	2%	6%	10%

Source: Dirección Nacional de Programación Económica Regional. April 2005

Main ecological services provided by the Ecoregion

243. The name Patagonia is recognized worldwide because the area has captivated renowned travelers, adventurers and naturalists. Tourism is a major economic activity in the Patagonian provinces, and it is hoped that it will increase in the future.

244. Another service worth highlighting, which is even more valuable than tourism, is the regulation of the river basins (maintenance of water quality, sediment load level and regulation of the water level when rainfall is high). Patagonia, particularly the Andean sector, may be considered as a reservoir of high quality freshwater. In addition, it supplies a large percentage of Argentina's hydroelectric power. Patagonian reserves contain 85% of Argentina's oil (Cuenca Neuquina, Cuenca Golfo San Jorge and Cuenca Austral), 99% of the coal, 80% natural gas and 70% hydroelectric power. It has 25% of the installed capacity for electrical power generation, and it generates 20% of the total electricity for Argentina.

245. Other non-quantified environmental services are carbon sequester by natural forests and grasslands and maintenance of biodiversity. The region would seem to be the most appropriate in Argentina for carbon sequester, due both to its size and to its biophysical characteristics. Regarding biodiversity, both the forest and the Patagonian steppe represent unique biomes and have been prioritized on international conservation agendas ("Global 200 sites". Olson y Dinerstein, 1997).

PART V. Problem, Threats, and Barrier Analysis Table.

Table 12

Environmental Impact Land Degradation	Root Causes	Management Issues/Key Barriers	Baseline activities	Solutions/ Barrier removal activities
Threat 1 : Poor range management with respect to flock distribution and overstocking				
<p>Loss of brush and grass cover Loss of biodiversity of native grass species. Replacement of palatable plants by unpalatable woody species Degradation of meadows (mallines).</p>	<p>Limited knowledge and awareness of the effects of intensive grazing on steppe and meadows.</p>	<p>1.1. Social capital limitations among large, medium and small producers and their families limit information exchange and consciousness raising.</p>	<p>Rural Associations provide social infrastructure and connections to producer’s federations that provide a platform for contact between medium producers, large producers and services. Small farmers organized into cooperatives that connect to Federations. Many small producers do not belong to cooperatives. Experts working in PSA and PROINDER provide assessment to a limited number of cooperatives. Rural education syllabus includes desertification issues but educators lack appropriate teaching materials and techniques. No mass media campaigns on the importance of SLM are in place.</p>	<p><i>Output 2.1:</i> Organizational structures established and strengthened to increase participation and exchange of information between producers and programs <i>Output 2.3:</i> Large, medium and small breeders increase their awareness and knowledge of land degradation and SLM practices. <i>Output 2.4:</i> Rural families increase their knowledge and awareness of the land degradation problems and SLM practices. <i>Output 3.2.</i> Local experts, extension officers and private consultants trained and equipped to implement TME as an integral part of their programs and projects.</p>

Environmental Impact Land Degradation	Root Causes	Management Issues/Key Barriers	Baseline activities	Solutions/ Barrier removal activities
	Producers trust traditional livestock management technologies that match their perception of risk and sense of immediacy. Limited exposure, knowledge and access to profitable TME technologies.	1.2. Institutional constraints and limited human resource capability limits information and exchange capacity of federal and provincial government extension services, to channel information and resources available for TME.	About 30 field agents with limited infrastructure and equipment disseminate information and transfer technology in Patagonia's vast territory. Provincial governments and INTA have extension services, but they are not integrated and lack trained human resources and funding.	<i>Output 2.2:</i> Production information accessed by producers through an Integrated, participatory extension and technology transfer system developed and implemented.
	Small producers with land tenure problems and small herd sizes	1.3. Restricted participation in programs, access to subsidies and credits and information exchange by small producers due to land property certification requirements.	Provisions in LO will provide benefits and options to cooperatives. Greater levels of association needed to include small producers will be achieved.	<i>Output 2.1.</i> Organizational structures established and strengthened to increase participation and exchange of information between producers and programs
	Small, medium and large producers unaware of cost effective and environmentally sound alternative technology (TME).	1.4. Limited local TME experiences in representative ecosystems and real production systems.	500 producers and 2 million hectares with partial TME application. Most of them lack sufficient records of management and productive changes, and few are open to visits of other producers..	<i>Output 2.5:</i> On-the-ground models for TME technologies validated.
Threat 2: Overdependence on unpredictable and variable grazing systems for sustained livelihoods				
Economic vulnerability to withstand changes in markets, and climatic hazards leads to low profitability and then abandonment of pastures, leading to the impacts listed above.	Limited access to information and advice on timing of stocking rate variation, increases the probability of losses due to climatic events (droughts, snow storms) and hamper	2.1. Dispersion of information needed for technical forecasting and decision-making.	Partial GIS and Decision support systems developed in federal and provincial agencies of the 6 Patagonian Provinces Initial reports of snow	<i>Output 1.2.</i> Decision support system (DSS) completed, integrated and functioning within 6 provinces.

Environmental Impact Land Degradation	Root Causes	Management Issues/Key Barriers	Baseline activities	Solutions/ Barrier removal activities
	sound decisions on public funds allocation on productive SLM initiatives.		hazards in 3 provinces. Limited access to uncoordinated and incomplete sources of information by producers and public decision makers.	
	Lack of effective alternatives for economic diversification related to biodiversity and natural resource conservation on the farm system.	2.2 Lack of formal registry of conservation initiatives and rural custodians of natural resources. 2.3. Experiences and tangible results form conservation alternatives have not been tested or validated for financial and environmental success. 2.4. Lack of a conservation map that identifies areas with environmental value in rangelands that could guide the establishment of conservation reserves on private lands.	About 10 producers have established wildlife refuges and conservation areas but these initiatives lack proper registration, do not make long-term compromises and do not receive incentives. Approximately 500 abandoned farms act as informal protected areas, but they do not make conservation arrangements, lack management and do not receive incentives. Many farms could benefit from formal conservation status and better documentation of biodiversity and natural resources through eco-tourism and incentives.	<i>Output 2.6:</i> On the ground models for conservation within private lands validated. <i>Output 3.3</i> Incentives for the application of SLM on rangelands and conservation alternatives on private lands developed
	Federal and provincial fiscal instruments do not recognize and reward sustainable systems. Market prices do not differentiate products developed under proper land	2.5. Lack of normative actions, policies, criteria, and instruments that enable incentives for SLM and differentiated product protocols to be established at the provincial level.	Fiscal exemptions are granted to producers that get access to LO credit. Producers under existing protocols of organic production do not obtain differential prices.	<i>Output 3.3</i> Incentives for the application of SLM on rangelands and conservation alternatives on private lands developed.

Environmental Impact Land Degradation	Root Causes	Management Issues/Key Barriers	Baseline activities	Solutions/ Barrier removal activities
	management.			
Threat 3: A non-sustainable stocking increase in response to better relative market prices and economic incentives leads to land degradation.				
<p>Re-stocking of farms leads to increased threats of environmental impacts.</p>	<p>Unfamiliarity of land degradation processes by provincial decision makers, and producers limits holistic land-use planning, management, and financial commitment.</p> <p>Lack of long-term monitoring systems of range condition impedes an objective evaluation of degradation processes</p> <p>Lack of shared data bases on forage and animal production in farms under TME prevents learning from real experiences.</p>	<p>3.1. Gaps in knowledge and information on land degradation processes, sustainable land management, TME and DSS in decision makers at provincial level and producers.</p>	<p>SLM practices have been developed and described in technical manuals, WebPages and other documents.</p> <p>Provincial decision-makers and associations of producers have different levels of understanding of the SLM practices.</p> <p>Data of forage evaluations and animal production of farms under SLM is dispersed and not accessible</p> <p>Long term monitoring techniques and indicators have been developed with LADA and PAN projects but the ground points are not installed.</p>	<p><i>Output 1.3.</i> Public and private Institutional and NGO’s human resources capacity to implement SLM is fortified.</p> <p><i>Output 1.2.</i> Decision support system (DSS) completed, integrated and functioning within 6 provinces.</p>

Environmental Impact Land Degradation	Root Causes	Management Issues/Key Barriers	Baseline activities	Solutions/ Barrier removal activities
<p>These factors collectively lead to:</p> <p>Reduction in ecosystem function (i) loss of CO₂ capture and storage. (ii) Reduced water availability in meadows “mallines” (iii) Soil nutrient and organic matter loss.</p> <p>Loss of ecosystem resiliency: (i) reduced resistance to wind and water erosion, (ii) irreversible transitions in rangeland leading to soil loss, dune and desert pavement formation.</p> <p>Reduction in ecosystem services (i) decline in quality and quantity of water produced in rangelands for human and livestock use. (ii) loss of forage biomass and increase of unpalatable species. (iii) loss of habitat to shelter livestock and biodiversity. (iv) increase in animal production variability and susceptibility to climatic events.</p> <p>Demographic instability and loss of local knowledge and expertise</p> <p>Vulnerability to effects of climate change.</p>	<p>Sector focus rather than a territorial focus in planning and economic development programs that takes into account the bio-physical aspects of economic development and sector programs.</p>	<p>3.2. Lack of awareness of SLM concerns and the role in economic development planning by multiple sectors.</p> <p>3.3. Low connectivity because of distances between implementing organizations.</p> <p>3.4. Face to face meetings in Patagonia are cost prohibitive.</p>	<p>Environmental and productive aspects of SLM are separated in provincial administrative agencies. Extension capacities in federal and provincial agencies are incompletely coordinated.</p> <p>COFEMA assembles provincial environmental agencies.</p> <p>ENTE LÍNEA SUR coordinates extension in provincial, federal and producer’s institutions of Rio Negro</p> <p>Parlamento Patagónico groups legislators of the 6 provinces..</p>	<p><i>Output 1.1</i>: Institutional access and interaction catalyzed through the establishment and consolidation of the Patagonia network (REPAM) across 6 provinces and among national level institutions.</p>
	<p>Lack of a shared view and understanding of SLM between projects of different agencies.</p>	<p>3.5. Missing policies, criteria, and instruments at the provincial and agency level that mainstream SLM into Federal and Provincial sector support programs.</p>	<p>LO explicitly requires SLM practices to allocate credits and subsidies. PSA and provincial incentives formally require SLM but lack protocols of the management practices that are involved</p> <p>The decision makers of these projects are partially aware of SLM practices and general consensus has not been attained.</p>	<p><i>Output 3.1</i>. Norms that mainstream SLM into programs and projects are unified between agencies and projects.</p>

PART VI: Executive Summary of TME technology, Monitoring, DSS and Early Warning Systems.

Context

246. Productive systems in Patagonia have a series of climatic, commercialization, and market access restrictions that limit breeder's options to a small group of extensive husbandry combinations: sheep for wool, sheep for meat and wool, goats, bovine and combinations thereof (Borrelli et al. 1997, Mendez Casariego 2000), and producers from different ecologic backgrounds have established by tradition management systems and practices that in many cases are not efficient in the current context. The global stocking rate and animal distribution within paddocks was established during the early stages of colonization based on animal production indexes (mainly wool), without taking into account pasture and land attributes. These figures remain more or less fixed unless reproduction indices warrant an adjustment (Oliva et al. 1995). The limited profitability and low reinvestment rates in the field lead to large, heterogenous management units (pasture grounds), generally including small areas of higher productivity (meadows or "mallines") that remain subject to the general field management. At the other extreme, small breeders have small farms that frequently lack of perimeter fencing and paddocks to make a proper grazing management.

247. Rangeland science in Argentina is recent, and still has to develop into up-to-date government policies and rural financial instruments. Some early workers have pointed out the need of a scientific approach of the management of rangelands taking into account early indicators of degradation (Bailey Willis 1910, Auer 1951, Soriano 1956a, b), but range science development only started in the late 70's, mainly in federal Agricultural Research Agencies such as INTA and University of Buenos Aires in basic ecological research. By the end of the 1980's three different range evaluation methods were developed, one based on Pastoral Value Indexes drawn from step-point quadrat estimations of forage species cover (Elissalde et al. 2002). A second one known as Santa Cruz method, that evaluates forage biomass by direct clipping of short grasses and herbs, and utilization rate using residue height of key species of short grasses (Borrelli and Oliva 2001). Range condition inventories have also been produced to aid management, and a considerable effort was put into their translation into Province and Transition models (Paruelo et al. 1993). The third method uses these inventories to draw a matrix of sites and condition per paddock and adjusts stocking rates based on evaluations of ANPP in each condition (Bonvisutto et al. (Siffredi and Becker 1999), Paruelo and Deregibus Golluscio, R.A.; Deregibus, V.A. and Paruelo, J.M. 1998.). Between 1990 and 1994, with international support of GTZ (Germany), INTA and other institutions performed a general assessment of the desertification status (Goergen 1995, Oliva et al. 1995, Del Valle 1998, DHV-SWEDFOREST 1998). As a side-effect of this project, image processing units and GIS training and equipment were installed in the area. Public funds for range evaluation and education were allocated to different desertification projects between 1989 and 2003 and allowed for training and support for rangeland evaluation that has reached to approximately 4.5 M ha by 2004.

Technological description

248. TME is based on a joint analysis between producers and technicians on the natural resources situation and management strategies. It is described as: “A group of practices that allow for the improvement of wool and meat production in husbandry systems based on natural grazing pasture, ensuring at the same time rangeland conservation. (Borrelli 2001a, 2001)”. Analysis elements involved in TME for the planning of a productive system include the evaluation of natural resources, animal production level, and economic aspects.

249. Evaluation phase

- Natural resources are evaluated on geo referenced satellite image, in which the ranche’s cartography and infrastructure are displayed. Effective pasture area is established for each paddock, and the location of high potential sites (mallines) and infrastructure (fencing, watering stations) is established. NDVI from satellite images is calculated and its distribution in the paddocks is also analyzed, because it relates to forage offer in some areas (Elissalde et al. 1999).
- Forage availability is evaluated on the field for each management unit using one of the three range evaluation methods that offer advantages for different vegetation structures and system types, but produce comparable information in terms of biomass dry forage matter available by paddock.
- Information on animal production is obtained from producers and includes: animal type, number and category, farm sales, mortality, total and individual wool production, fiber diameter and clean fleece weight.
- Economic information refers to: income, costs, net income and profitability. It is established from interviews and system models at property level that are in different elaboration stages (Mendez Casariego 2000).

250. Management planning

- Establishment of goals and objectives. Commercial strategies and production goals are established by joint agreement with the producer in a mid term plan (5 years)
- Grazing Plan: The number and type of animals, time and usage system by pasture ground is established assigning to each animal the amount of forage to cover maintenance, gestation and lactation needs. In addition, a remnant of approximately half of the above-ground forage biomass is left without consuming to ensure the regeneration of the pasture. (Borrelli 2001b). This strategy achieves best individual animal production levels and obtains the best possible result from a breeder point of view without inducing unfavourable transitions in natural pastures. When possible, rest and differed grazing is employed in paddocks with mallines to promote their recovery.
- Sheep flock structure. The relationship between reproductive and non-reproductive animals is analyzed in accordance to commercial plan (selling of wool or meat) for an established level of nutritional restriction (Borrelli, 2001). Many establishments maintain by tradition sheep flock structures that do not maximize extraction rates and unnecessarily overload pastures for a determined production level.
- Sheep-shearing type. Pre-lambing shearing is recommended since it increases the weaning percentages, decreases lamb mortality and permits a better management of the lambs (Camejo 1993). In addition, this technique allows using of summer pastures earlier and increases the wool yield. Special shearing practices such as Tally Hi o

Bowen, sequential shearing, wool conditioning and classification. (typified in the PROLANA program) and non-contaminating packaging are suggested.

- Reproduction Management. Male Sheep examination is recommended to avoid reproductive diseases. The management of males to ensure an orderly birth date and the appropriate date of lamb weaning are also discussed with the producer.
- Genetic Improvement. The improvement objective is established with the producer. The main tool that is used for improvement is the selection of sheep by genetic merit with objective evaluations (included in the PROVINO program and in progeny tests) and the selection and disposal of inferior females (Mueller 2001).
- Sanitary Management. The calendar of product application for the control of most common diseases (external and internal parasites) is reviewed and the presence of infectious diseases or intoxications is evaluated. Management adjustments and specific treatments are suggested (Robles and Olaechea 2001).
- Predator Control. Selective methods are recommended for fox and puma control in contrast with prohibited practices like the use of poisoned meat baits that have an impact on other carnivorous of the ecosystem.
- Installations (maintenance and improvement plan). Due to infrastructure cost, recommended improvements are limited to the division of more productive areas like mallines. Field subdivisions are recommended in extreme cases of heterogeneity usage that compel taking advantage of important parts of the pasture grounds. The installation of lambing shelters is also analyzed in small breeders' cases.
- Winter risks and drought effects control. To confront severe snowfalls and prolonged droughts, forage storage and distribution is recommended to supplement animals.

251. TME constitutes a group of “good practices” applicable to livestock production in extensive conditions. It does not introduce new elements to usual producers' practices, except the performance of a forage availability evaluation. There is no need for new market development or commercialization channels or big investments in infrastructure, therefore its cost is the assessment of competent professionals with proved experience and the provision of satellite images and cartography. Forage estimation of rangelands using any of the three evaluation methods is done at a rate of 5 to 10 thousand daily hectares by a team of two persons. This process is based in the adaptive management concept that permits to learn from experience, since pasture forage offer and animal production results are evaluated ideally every year in order to make the necessary corrections and adjustments.

TME methods are mainly oriented to regulate stocking rates in continuous or summer/winter grazing systems. Some of the range management methods that have been developed and applied successfully in the more mesic areas of Patagonia rely on rotational strategies of use (Golluscio 1998). Within the project, they may be used in the more productive areas with enough paddock infrastructure, or where significant meadows are present and need to be protected. One of the limiting factors of this practice is that the rest period must coincide with a short growth season in the drought and temperature-limited systems of Patagonia (Golluscio 1998). The use of rotational systems is restricted in drier areas, where the length of the growth period is shorter, and annual variability of forage production is higher (Paruelo y Lauenroth 1998, Jobbágy et al. in press, Oesterheld et al. 1998).

TME in relation to economic sustainability

252. The results of TME application in real cases do not always require the reduction of stocking rate. In 30 ranches of Austral Patagonia (Borrelli 2001b), a global stocking reduction of 35% was required, an animal redistribution of 30%, and a stock increase was recommended in 25% of cases. Remaining 10% were establishment with the correct animal assignation. From an economic point of view, TME application stabilizes production and makes it less dependent of climatic cycles. In those cases where the reduction of the stocking rate is necessary, this is generally compensated by an increase in the individual production in wool/meat production systems. Wool production systems are less sensible to nutritional issues and generally overgrazing is more profitable in the short term. However, natural pasture degradation in the mid term de-capitalizes the producer in addition to produce a series of negative externalities for the environment and society. The application of TME practices associated to small investments like electric fencing or lambing shelters in the small farms (minifundios) that are based on familiar work, have also demonstrated excellent results for subsistence systems. TME applied to real situations in many fields and during many years demonstrated the capacity to generate 18 and 33% more of net income than those obtained through traditional technologies usage, which is due to a lower mortality rate and a higher number of animals and better quality and quantity of wool available for sale.

TME in relation to the structure, integrity and functioning of natural pasture ecosystems.

253. The degradation process of rangelands has been affecting production in Patagonia, but this slow decline remains masked by the annual production variability characteristic of semiarid systems. When vegetation loses its capacity to transform rainfall in forage, this is sensed by the producers through their animal production indexes and explained as a climate change. Figure 1 shows an example of North Patagonia, but similar declines have been observed elsewhere, as in the Magellan Straits, where farmers reported 16% stocking loss in 20 years. When asked about the cause, 80% of them attributed it to a decline in mean rainfall, while actual climatic data for the region demonstrates the opposite (Oliva et al. 2004b).

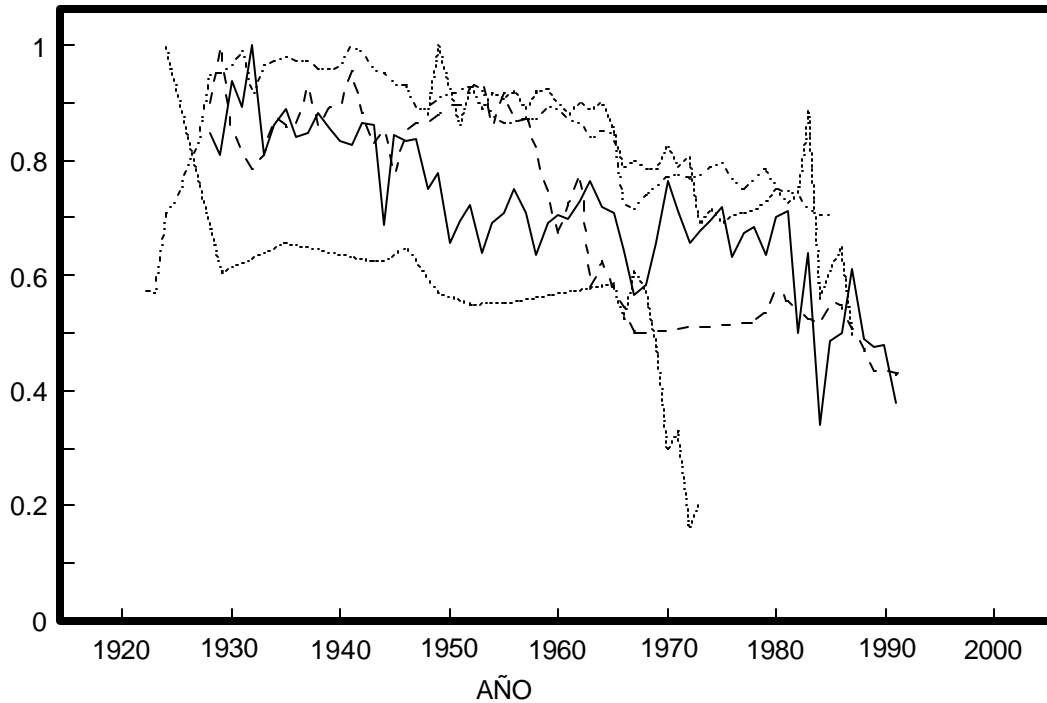


Figure 2. Relative sheep stocking rates in four farms of North Patagonia: Pilcañeu (—), San Ramón (- - -), Montoso (.....), Alicura (- . - . -) and Leleque (- - - - -). 1=maximum historical stocking rate for each farm. From (Golluscio 1998).

254. The challenge of range management is to check this long-term degradation before it is reflected in animal production, because the transitions are mostly irreversible. Rangelands in Patagonia show stable provinces dominated by long-lived perennials, and these systems have great stability but low resilience in front of grazing disturbance. The rangelands are dominated by perennial plants with a short grazing evolutionary history (Milchunas et al. 1988), that rely heavily on vegetative reproduction and do not generate banks of persistent seeds (Soriano 1960), that help to regenerate disturbed areas in other arid ecosystems. Modifications of communities under excessive grazing are varied, and schemes of Provinces and Transitions (Paruelo et al. 1993), show that they are centered in the replacement of grasses by shrubs of less palatability and the loss of thin particles of the soil, that probably drag down an important part of organic matter and nutrients (Oliva et al. 2000). Degraded pastures also lose their patch structure that determines a network of sewers and drains. Nutrients, soil and propagules that are displaced by aeolic erosion are thus lost from the system. (Aguilar and Sala 1994, Ludwig and Tongway 1996).

255. Grazing animals with forage assignment according to TME leave approximately a 50% over the forage biomass. This level of residue is considered necessary for regeneration according to a rule-of-thumb known in pasture management (Stoddart and Smith 1955), and it is assumed that this level of grazing does not affect less palatable species. Pastures less than 10 years of TME regulated stocking rates increased their total vegetal coverage (Figure 2.) and the coverage of grasses and palatable herbs also maintained their diversity. (Figure 3).

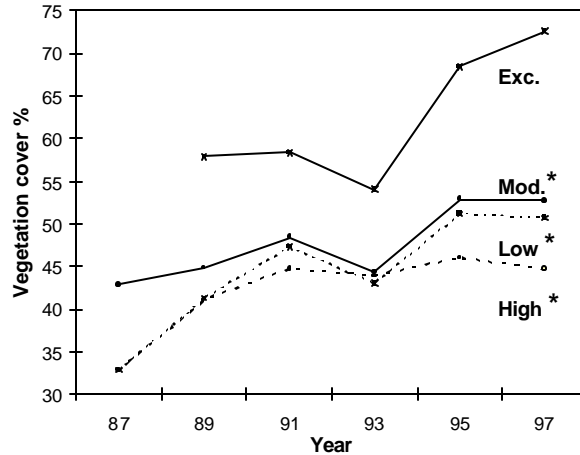


Figure 3: Vegetation cover in 10 years of a grazing trial in Magellan Steppe. Treatments were Exclosure (Exc. 0 sheep/ha), High (0.60 sheep/ha), Moderate (Mod 0.33 sheep/ha), Low (0,20 sheep/ha) stocking rates. Moderate stocking rates were regulated using TME range evaluation methods (Oliva et al. 1998). Asterisks indicate significant vegetation increments in the 87-97 contrasts for each treatment.

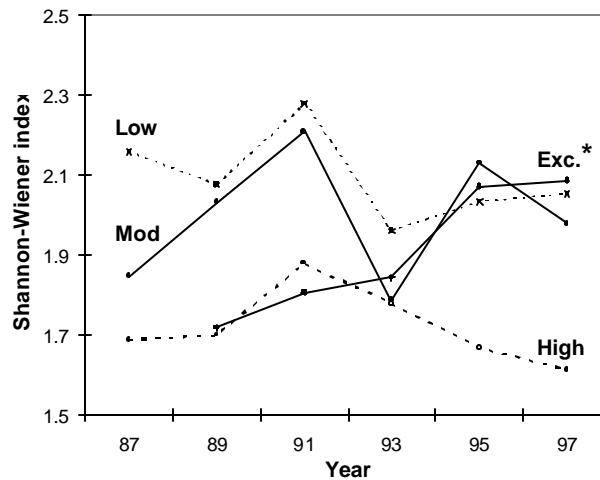


Figure 4: Biodiversity according to Shannon Wiener Index in 10 years of a grazing trial in Magellan Steppe. Treatments were Exclosure (Exc. 0 sheep/ha), High (0.60 sheep/ha), Moderate (Mod 0.33 sheep/ha), Low (0.20 sheep/ha) stocking rates. Moderate stocking rates were regulated using TME range evaluation methods (Oliva et al. 1998). Asterisks indicate significant vegetation increments in the 87-97 contrasts for each treatment.

256. Demographic projection models applied in populations of dominant Tussock grasses (*Festuca gracillima*) in Magellanic rangelands, demonstrate that those under TME-regulated stocking rates have long survival periods, while populations subject to high stocking rates would disappear in about 20 years (Oliva et al. 2005). These evidences indicate that a broader scale application of TME will probably stop range vegetation degradation due to overgrazing. Regional and long term monitoring systems to be put in place with GEF initiative will allow objective evaluation of structure and function of the rangelands, to verify if they are maintained or enhanced as a result of joint efforts of management improvement.

Proposed decision support systems

Introduction

257. A DSS will be developed for the Patagonian region that will include a GIS, simulation models, a range monitoring system and an early warning system.

258. Decision Support Systems are defined broadly as interactive computer-based systems that help people use computer communications, data, documents, knowledge, and models to solve problems and make decisions. DSS are ancillary or auxiliary systems; they are not intended to replace skilled decision makers. This DSS will provide decision makers involved in the project (SAGPyA, SayDS, Provincial governments, INTA, NGOs and Breeder Associations) with up-to-date information regarding sustainable land use management, policy design, programs, projects, credit, incentives, etc., and will promote up-streaming of SLM in the decision making process. This tool will help on the visualization and analysis of the actual province of production systems and their tendencies, the evaluation of new production alternatives, impact of technology adoption, credit utilization and information gaps for the development of adequate research on appropriate technologies.

GIS

259. Geographic Information Systems (GIS) is defined as an information system that is used to input, store, retrieve, manipulate, analyze and output geographically referenced data or geospatial data, in order to support decision making for planning and management of land use, natural resources and environment. GIS are a key element for organizing information at the provincial and ranch level in Patagonia. Thematic maps of natural resources, provincial satellite mosaics, cadastral maps, politic division, cities, towns, roads, hydrographic basins, eco regions, climate, vegetation, soils, geology, geo morphology, protected areas, desertification, socio economic, livestock production and stocking rates will be elaborated. Information at ranch level will facilitate breeder and expert participation in the decision making process. A database will be designed that will centralize existing information related to animal husbandry and range evaluation as well as the information that is generated during the project. It will include size of the ranch, information on the breeder and his family, number and structure of flocks, weaning percentage, wool and meat production, average stocking rate (sheep, goat, cattle and horses), carrying capacity and range evaluation data. Information at site level will allow monitoring of vegetation tendency, soil stability and socio-economic variables, this information will help measuring the sustainability of the production systems. Each site will register the list of species, diversity, total vegetation cover, percentage of bare soil, percentage of soil covered with cryptogams, percentage of erosion pavement, erosion characteristics and socio-economic variables.

Simulation models

260. Computer simulation is the discipline of designing a model of an actual or theoretical physical system, executing the model on a digital computer, and analyzing the execution output. Simulation embodies the principle of "learning by doing" - to learn about the system we must first build a model and make it run. To understand reality and all of its complexity, we must

build artificial objects and dynamically act out roles with them. Computer simulation is the electronic equivalent of this type of role playing. It is a highly interdisciplinary field since it is widely used in all aspects of industry, government and academia. A series of computer simulation models of livestock production and the ecosystem for rangelands in Patagonia will be elaborated for large, medium and small breeders. These are multidisciplinary models that will involve both experimental work in the field and computer modelling. Recent results from rangeland modelling have indicated the important influence of livestock (sheep, goat, cattle and horses) on the stability and sustainability of rangeland systems. Consequently rangeland models depend on accurate representation of the performance of livestock and their impact on the vegetation and on the productivity of the whole system.

Monitoring systems

Table 13: Systems to monitor Patagonian rangelands will be produced at two scales:

	Farm scale	Regional scale
Units	Paddocks	Ecologic areas
Size	500-5000 ha	0.4 – 14 M ha.
Temporal scale	Annual	Decades
Relevant processes	Yearly rainfall Yearly farm stocking rate	Climatic cycles and global change. Natural disasters Regional stocking rate Macroeconomic cycles Rural migration
Relevant rangeland variables	Forage availability (kg /ha) Intensity and heterogeneity of grazing	Cover per plant species Vegetation patch structure Forage cover Desert pavement Litter/ cryptogams Organic matter Fertility (N, P, K) Texture, structure and stability of soil surface.
Evaluation methods	Pastoral value with point quadrats (Elissalde et al. 2002) Biomass estimation by clipping and height of key species (Borrelli et al. 2001) Matrix of productivity per range condition (Siffredi and Becker 1999). NDVI and ANPP per vegetation community (Paruelo and Dergibus).	MARAS (network of fixed ground points with point intercept lines) (Oliva et al 2004)
Stakeholders	Producers LO and provincial incentive decision makers	Land use planners LO and provincial decision makers

	Eco certification companies	Politicians NGO's
Financing	Private (credit lines of LO are available)	Public (GEF/provinces and LO)
Type of decisions	Yearly adjustment of stocking rate per paddock. Award of ecological/organic farm certificates	Adjustment of regional policies for ovine sector in relation to the trend of rangelands Land use planning Mitigation measures in relation to the drought effects on rangelands Award of ecological certificates to regional groups of producers.

261. At the Farm Scale, range evaluations concentrate in yearly variations of forage that allow for adaptive management. This data is collected by extension agents related to INTA, by provincial extension officers or by private consultants. Producers contract these services from professionals included in range evaluator registries in the provincial administrations and pay for them through LO credit lines or privately. These rangeland evaluations will be mandatory for all LO credits and with GEF initiative will also be mainstreamed in all the provincial and national incentives. The strategy of GEF project will be to unify the protocols of the range evaluation requirements, collect and introduce this data in a GIS data base of the DSS, and provide feedback to LO and other provincial or national decision makers in order to adjust decisions based on on-the ground results.

262. At the Regional scale a different system for the evaluation of early indicators of rangeland condition is needed for three reasons (1) The variables recorded in repeated rangeland assessments are few and not sensitive enough to avoid transitions (2) The time scale (years) and the spatial scale (estancias) are not appropriate to monitor regional processes (3) The private funding of range evaluations implies restrictions on data and limits the area of application in the case of small subsistence producers and abandoned areas. The MARA system (Oliva et al. 2004a) of Patagonia backed by a NAP program and LADA (FAO), was developed to monitor ecologic units with ground monitors at a density of approximately 1 per 20.000 ha, that matches the size of cadastral units. A central web data base will be designed with GEF funding to validate the entries using a single species and indicators list for the entire region and connect the points in the GIS layer. Information will be selectively accessible to different federal and provincial governmental agencies and NGO's, and will be adopted as a unified system by the different provincial departments of agriculture. The field layout matches the one used by West Australia's WARMS method (Holm 1998), and also is inspired in the USDA method designed in the Jornada Experimental Station (Herrick et al 2005). GEF funds will encourage interaction with the responsible persons of these programs in order to learn from their experience. Evaluations will be performed by trained and registered private consultants or by government personnel and paid for initially by GEF and subsequently by the provinces. The number of monitors will be carefully assessed in order to assure fewer repeated measures instead of a high number of single observations based on WARMS experience (initially, about 600 monitors established at a rate of 120 per year are planned). The sites will be revisited every five years. Although few data will be available at the end of the project, the network of monitors will allow for the first objective evaluations of trends of rangelands in the future.

Early warning systems

263. Extensive sheep production systems are vulnerable to climatic fluctuations. Recurrent snow storms may kill animals by covering them or by preventing them to obtain forage for extended periods. Prolonged droughts weaken the animals, reduce lambing rates and may severely affect rangelands and induce erosion processes. These natural disasters are not covered by insurance schemes by a number of causes: (1) climatic variability is high (2) natural disasters affect great areas at a time, so that a high number of producers are affected simultaneously. This implies rates that would be too expensive for most (90%) of the producers, and discourages big insurance companies to intervene. National Agricultural Emergency Law 22913 and LO, enable subsidies, tax exemptions, forage provisions or special funding for animal purchase in these cases, but they usually act after the disasters occur.

264. TME reduces winter and drought mortality because well-fed animals are less sensible to nutritional restrictions. Properly managed paddocks retain also high grasses such as tussocks and shrub forage that is not easily covered by snow and act as forage reserves during drought. The recommended practices also include use of forage reserves for these situations, but forage production areas are scarce and supplements expensive, so that sound management of them is necessary. Timely intervention and distribution of supplies or stocking reduction decisions faced with emergencies are not possible because early warning systems of these climatic events are not in place. Faced with increased fluctuations predicted by global climatic change models, these systems are a strategic tool to reach sustainability.

265. Climatic models and meteorological predictions have been improving, and an initial Warning system has been developed with an INTA- National Meteorological Service agreement. The system faces the problem that hard data from meteorological stations in Patagonia is scarce and scattered. Within the GEF initiative this network of stations will be strengthened, and integrated. Mass media and extension services will be used to deliver early snowfall warnings to producers and decision makers of LO and National Emergency Laws. Historical satellite images will be analyzed in order to produce maps of extent and duration of snow cover, to prepare a map of winter risks that will aid in decision making.

266. Drought alert systems will be put in place using rainfall records and satellite imagery. Early spring Normalized Vegetation Index from NOAA imagery has been analyzed by University of Buenos Aires, and it allows predictions of Annual Primary Productivity changes in Patagonia. This type of analysis will be up-scaled to the whole region and performed in a real time basis to produce drought alerts and orient stocking relief and supplementation schemes.

PART VII Executive Summary of the Proposed Production Models

Table 14: Description of production demonstration models.

	Model	Number of farms	Mean Surface (ha)	Number of sheep units	Demonstration goals (ha)	Transfer goals (ha)
Medium	Sheep for meat and wool 4000	3	20.000	4.000	60.000	3.000.000
	Sheep for wool 3000 sheep	2	15.000	3.000	30.000	1.500.000
	Sheep for wool 1500 sheep	3	7.500	1.500	22.500	1.125.000
Small	Sheep, cattle, goats and horses	4	2.500	550	10.000	500.000
	<i>Subtotal</i>	<i>12</i>				<i>6.125.000</i>
Diversified	Sheep for wool and meat with agro tourism	6	15.000	2.000	90.000	180.000
	<i>Total</i>	<i>18</i>				<i>6.305.000</i>

267. Medium

1. Corriedale sheep for meat and wool; typical *estancia* in the Santa Cruz and Tierra del Fuego provinces. This is a 20 thousand Ha. located in de Tierra del Fuego, Estepa Magallánica or south Santa Cruz. It may have 4.000 Corriedale sheep in 20.000 Ha., in private property. The breeders and their families usually live at least partially on cities, and sometimes rely on off-farm activities to complement their income. Facilities include full perimeter fences and at least 5 paddocks, a full shearing shed, windmills and comfortable houses. Production is oriented to lamb meat and corriedale wool that is not as profitable as fine merino wool. Around 75% of the flock are reproductive animals. Weaning percentages are approximately 65% and each animal produces about 4,5 kg of wool. The rangelands are usually overstocked, with transitions of dominant bunchgrasses to dwarf shrublands. Snowstorms cause 20-50% losses in a frequency of 5-10 years. Producers are usually receptive to new farming practices. The TME models for this system include annual range forage evaluation, stocking rate and animal distribution adjustments, pre-weaning shearing, sanitary management, genetic improvement, forage supplementation and winter feeding based on early warning systems. Farms with adjusted stocking rates usually maintain total wool production because of increased individual animal production indexes, and increased yield. Weaning percentages increase to 75%, so that a lamb surplus is generated for sale.
2. Merino sheep for wool. This is a common production system of provinces of Chubut and Rio Negro. It may have 3.000 merino sheep in 15.000 Ha., under private property. The breeders and their families usually live at least partially on cities, and sometimes rely on off-farm activities to complement their income. Facilities include full perimeter fences and at least 4 paddocks, a full shearing shed, windmills and small dams. Production is oriented to fine merino wool and in second place lamb meat. Only 55% of the flock is reproductive animals, with a high proportion of muttons. Weaning percentages are around 55% and each animal produces about 4,5 kg of wool that is usually strained, and of low yield because of

dust contamination. The rangelands are usually overstocked, with erosion evidences and shrub encroachment, but these producers usually occupy better rangelands. Droughts are common in a 4 year cycle and generate 15% losses. For educational and economic reasons, these producers are more receptive to new farming practices. The TME models for this system include range forage evaluation, stocking rate and animal distribution adjustments, pre-weaning shearing, sanitary management, predator control, and medium scale investments in watering, inter-seeding of meadows, electric fences for deferred grazing of meadows, and stock reduction in periods of drought in relation to early warning systems. Farms with adjusted stocking rates usually maintain total wool production because of increased individual animal production indexes, increase industrial quality and reduce dust contamination of the fibers. Weaning percentages increase to 75%, so that a lamb surplus is generated for sale.

268. Medium- small

3. Merino sheep for wool. This is the most frequent production system in provinces of Chubut and Rio Negro. It is usually stocked with around 1500 merino sheep in 7.500 ha, under private property. The producers usually live in the farm and rely on their production as the main income. Facilities include full perimeter fences and 3 or 4 paddocks, a simple shearing shed and windmills. Production is oriented to fine merino wool and in second place lamb meat. Only around 50% of the flocks are reproductive animals, with a high proportion of muttons. Weaning percentages are around 55% and each animal produces about 4 kg of wool that is usually strained, and of low yield because of dust contamination. Droughts are common in a 4 year cycle and generate 20% losses. The rangelands are usually overstocked, with erosion evidences and shrub encroachment. The TME models for this system include range forage evaluation, stocking rate and animal distribution adjustments, stock reduction in periods of drought in relation to early warning systems, pre-weaning shearing, sanitary management and predator control. Farms with adjusted stocking rates usually maintain total wool production because of increased individual animal production indexes, increase industrial quality and reduce dust contamination of the fibers. Weaning percentages increase to 75%, so that a lamb surplus is generated for sale.

269. Small

4. Mixed Sheep, cattle, goats and horse system. This mixed production system is typical of Neuquen and Rio Negro Provinces and NW of Chubut. The mean size is 2.500 ha, of fiscal or private property lands, mostly without subdivision and sometimes without perimeter fences. Its stock may have 15 cattle for meat, 60 sheep, 200 goats and 15 horses. In Chubut province these systems rely mostly on sheep and horses. Productive infrastructure is very poor. Weaning percentages for sheep may be around 50% and 80% for goats, and with this percentage most of the meat produced is for self-consumption and to maintain the flock. This is a subsistence-type farmer, frequently of native population origin that relies heavily in family labour for tending the animals and shows very poor range management. Droughts are common in a 4 year cycle and generate 25% losses. They usually have humid high potential areas that are overstocked. The TME models for this stratum

rely on forage evaluation and stocking adjustment when necessary. Small scale infrastructure such as electric fencing of meadows, lambing shelters, allow for forage deferment for a better nutrition of ewes at lambing, better protection from climatic conditions including stock reduction in periods of drought in relation to early warning systems, and predators. The improved model can show weaning percentages of 80% and 100% in sheep and goats respectively, which may increment profitability and generate a surplus for sale. Range management is improved because meadows are rested and animals have a better distribution.

270. Diversified

5. Sheep for wool and meat with agro tourism: These production systems combine agro tourism using natural and cultural resources (landscape, fauna, flora, historical, palaeontology) with sheep tending activities. We expect to establish 6 models for conservation within private lands. The size of these farms ranges 10.000 – 20.000 ha and has the basic productive infrastructure, including houses that can be used for lodging or catering of tourists. They need to be accessible and near to attractive sites as special landscape features, wildlife refuges (usually wetlands with migratory or endemic birds or fauna), or archaeological or paleontologic sites. The TME and conservation models include proper range management combined with special management of conservation areas (exclosures, seasonal grazing, and reduced stocking rate). Agro tourism is encouraged with small scale infrastructure and information on the resources of the conservation areas.

Location and/or criteria for site selection

271. TME models: Farmers that are interested in participating as demonstrative models will be identified by means of a request for tender of projects within the UEP units of the LO, with the participation of extension officers of each province. Range evaluations will be performed in the selected farms using TME practices. Sustainability evaluation will be carried out to establish the optimal stocking rate to obtain the maximum yield without degrading the grasslands. Productive investments (shelters, electrical fences, watering, rams, ewes) will be financed, if needed, with LO credits. Monitoring sites for rangeland condition, soil and forage availability will be installed. A complete monitoring of animal production and economic returns will also be set up with GEF resources. Transfer activities including field days, brochures, and courses on the application of TME practices will be also financed by GEF.

272. TME and Conservation models: A selection of potential rangeland conservation areas will be performed based in expert advice, literature and analysis of satellite image will be performed, and a map will be prepared for the DSS. Workshops will be held with the producers that manage possible conservation areas that are included in private lands, in order to transmit the value of these resources. Field surveys of flora, wildlife, landscape, historical or palaeontology resources will be performed with expert advice and participation of conservation NGO's and Universities in those farms that are interested in complementing their income with agro tourism in relation to the conservation of these areas. In TME + conservation models, animal productive potential of the rangelands with

TME will be evaluated by extension officers, and special management options of the conservation areas will be discussed (exclosures, reduced stocking rates, seasonal grazing). Normative for conservation areas will be analyzed in each province in order to find some type of long term conservation commitment (rural custodies, registries of private conservation lands).

273. Ecotourism development will be also analyzed and necessities of infrastructure and investments will be established. GEF funds will be used to prepare brochures and design pathways or wildlife observatories, and may be used to finance small scale infrastructure needed. Monitoring sites will be established in the productive and conservation areas and a full record of economic results will be kept. It is expected that agro tourism activities will compensate the loss of animal production in conservation areas, and may contribute to sustainability of small farms that do not reach adequate scale with TME alone. The benefits of conservation areas are self evident. The development of mechanisms of long term private conservation commitment could also be useful for other

Table 15: Description of innovative practices

	Sheep for meat and wool 4000	Sheep for wool 3000	Sheep for wool 1500	Sheep, cattle, goats, horses (Eq.500)	Sheep for wool and meat with agro tourism
Rangeland forage evaluation	X	X	X	X	X
Grazing planning	X	X	X	X	X
Yearly monitoring of forage and soil	X	X	X	X	X
Pre-lambing shearing	X	X	X	X	X
Sanitary control and management	X	X	X	X	X
Reproductive management	X	X	X	X	X
Selection and purchase of rams for genetic improvement	X	X	X		X
Meadow delimitation to defer grazing	X	X	X	X	X
Redistribution of water for forage production	X	X	X		
Inter-seeding of meadows		X	X		
Winter supplementation	X				
Drought strategic supplementation		X	X		
Lambing shelters			X	X	
Predator control	X	X	X	X	X
Delimitation of special conservation areas					X
Agro tourism					X
Dune fixation	X	X			
Rest rotation grazing	X	X			

Model implementation cost and rationale

Table 16: Economic returns

Model		Net income US\$ 2006	Expected value 2010	
			Without TME	With TME
Medium	Sheep for meat and wool 4000	33000	27000	60000
	Sheep for wool 3000 sheep	34000	28000	51000
	Sheep for wool 1500 sheep	16000	13000	25000
Small	Sheep, cattle, goats and horses (Eq.500 sheep)	6500	6000	12000
Diversified	Sheep for wool and meat with agro tourism	28000	25000	55000

Table 17: Lamb production

Model		Weaning % 2006	Expected value 2010	
			Without TME	With TME
Medium	Sheep for meat and wool 4000	70	70	90
	Sheep for wool 3000 sheep	55	55	75
	Sheep for wool 1500 sheep	50	50	70
Small	Sheep, cattle, goats and horses (Eq.500 sheep)	50	50	65
Diversified	Sheep for wool and meat with agro tourism	55	55	75

Table 18: Wool production

Model		Kg wool 2006	Expected value 2010	
			Without TME	With TME
Medium	Sheep for meat and wool 4000	4,0	4,0	4,5
	Sheep for wool 3000 sheep	4,4	4,4	4,8
	Sheep for wool 1500 sheep	4,2	4,2	4,5
Small	Sheep, cattle, goats and horses (Eq.500 sheep)	4,0	4,0	4,5
Diversified	Sheep for wool and meat with agro tourism	4,4	4,4	4,8

* an increase in 10% yield and traction resistance increases to more than 10 Nwt/kilotex

Table 19: Forage species cover

Model		% cover 2006	Expected value 2010	
			Without TME	With TME
Medium	Sheep for meat and wool 4000	20	18	25
	Sheep for wool 3000 sheep	15	12	18
	Sheep for wool 1500 sheep	15	12	18
Small	Sheep, cattle, goats and horses (Eq.500 sheep)	12	10	15
Diversified	Sheep for wool and meat with agro tourism	15	12	25*

* Including special conservation areas

PART VIII. Project Actions to create the Enabling Environment for broad-scale replication at the Landscape Level

Table 20. Project Actions for Broad-Scale replication at Landscape Level

Activity	Amount
1.1.1 Establish joint agreements	6,660
1.1.2 Develop and validate the political framework and strategic plan of the SLM REPAM.	12,660
1.1.3. Design the REPAM for SLM	32,320
1.2.2. Integrate, involve and complete the GIS for the SLM	104,770
1.2.3. Design and update simulation models of the productive systems.	69,300
1.2.4. Strengthen, develop and implement monitoring systems for SLM	65,350
1.2.5. Strengthen, develop and implement early alert systems (snowfalls, droughts and fires).	227,300
1.3.3. Provide support to the harmonization of institutional norms.	90,480
2.1.2. Channel incentives through the producers associations	155,340
2.2.4. Extension officers training	329,840
2.3.1. Courses and materials for teachers and create materials	114,480
2.3.2. Implement awareness and sensitizing activities	245,600
2.3.3. Strengthen training systems for livestock producers	212,400
2.4.1. Develop on-the-ground models for livestock pasture management and alternative uses in private lands.	214,400
3.1.2. Design, validate and publish SLM guidance	50,040
3.2.2. Training technicians in integral planning of establishments	329,840
4.2.2. Proliferation and dissemination of information	105,500
4.3.1. Edit and publish a document with the most successful experiences to be used at a national and international levels	52,500
Total U\$S	2,418,780

*See also narrative on Replication, Section I Part II.

PART IX. CO-FINANCING

Table 21. Detailed description of estimated co-financing sources

Outcome	Output	TOTAL	GEF	Total Co-Financ	GM	FIDA	SAGPyA	SAyDS	INTA	Provinces	UNDP
Outcome 1: Capacities built in institutions and stakeholders to incorporate SLM concepts into decision-making processes	Output 1.1: Institutional access and interaction catalyzed through the establishment and consolidation of the Patagonia network (REPAM) across 6 provinces and among nat. level institutions.	402,620	277,220	125,400	0	300	2,700	2,700	13,500	106,200	0
	Output 1.2: Decision support system (DSS) completed, integrated and functioning within 6 provinces.	1,315,746	778,196	537,550	29,250	0	0	0	422,500	85,800	0
	Output 1.3: Public and private Institutional and NGO's human resources capacity to implement SLM is fortified.	1,194,080	414,080	780,000	0	0	0	0	0	780,000	0
	Total Outcome 1	2,912,446	1,469,496	1,442,950	29,250	300	2,700	2,700	436,000	972,000	0
Outcome 2: SLM applied in Livestock production systems.	Output 2.1: Organizational structures established and strengthened to increase participation and exchange of information between producers and programs.	1,327,650	277,650	1,050,000	0	1,050,000	0	0	0	0	0
	Output 2.2: Production information accessed by producers through an Integrated, participatory extension and technology transfer system developed & implemented.	5,162,382	945,170	4,217,212	0	0	1,411,785	0	1,899,427	906,000	0
	Output 2.3. Large, medium and small breeders increase their awareness and knowledge of land degradation and SLM practices.	872,400	302,400	570,000	0	0	360,000	0	60,000	150,000	0
	Output 2.4. Rural families increase their knowledge and awareness of the land degradation problems and SLM practices.	918,930	626,930	292,000	0	0	0	0	0	292,000	0
	Output 2.5. On-the-ground models for TME technologies demonstrated.	419,200	95,200	324,000	0	0	324,000	0	0	0	0
	Output 2.6: On the ground models for conservation within private lands validated.	419,200	95,200	324,000	0	0	324,000	0	0	0	0
		Total Outcome 2	9,119,762	2,342,550	6,777,212	0	1,050,000	2,419,785	0	1,959,427	1,348,000
Outcome 3. Livestock promotion and incentive programs and projects incorporate SLM into on-the-ground investments in livestock pasture mgnt. and conservation alternative employment.	Output 3.1. Norms that mainstream SLM into programs and projects are unified between agencies and projects.	102,760	62,760	40,000	0	2,000	4,000	2,000	32,000	0	0
	Output 3.2. Local experts, extension officers and private consultants trained and equipped to implement TME as an integral part of their programs and projects.	404,250	308,250	96,000	0	0	60,000	0	36,000	0	0
	Output 3.3: Incentives for the application of SLM on rangelands and conservation alternatives on private lands developed.	17,957,753	72,460	17,885,293	0	0	1,963,860	0	0	15,921,433	0
	Total Outcome 3	18,464,763	443,470	18,021,293	0	2,000	2,027,860	2,000	68,000	15,921,433	0

Outcome	Output	TOTAL	GEF	Total Co-Finan	GM	FIDA	SAGPyA	SAyDS	INTA	Provinces	UNDP
Outcome 4: Effective Project management through learning, evaluation, and adaptive management.	Output 4.1: Project monitoring and evaluation.	328,500	328,500	0	0	0	0	0	0	0	0
	Output 4.2: Effective management of project resources.	880,650	551,650	329,000	150,000	0	0	129,000	0	0	50,000
	Output 4.3: Lessons learnt disseminated.	48,300	48,300	0	0	0	0	0	0	0	0
	Total Outcome 4	1,257,450	928,450	329,000	150,000	0	0	129,000	0	0	50,000
	TOTAL	*31,754,421	*5,183,966	*26,570,455	179,250	1,052,300	4,450,345	133,700	2,463,427	18,241,433	50,000

*This amount does not include the \$ 380,000 PDF-B (Project Preparation) Funds.

PART X Lessons Learnt Matrix

Lesson learnt	Project design response
<i>Fundamental importance of effective and genuinely inclusive stakeholder participation</i>	
<p>Without the support of those upon whom the project impacts, progress will be slow and unsatisfactory to all involved. Effectively involving stakeholders will ensure long-term success of conservation in Patagonia because of the relevant knowledge and experience incorporated by them.</p> <p>It's vital to recognise that the success or otherwise of a project rests with 'stakeholders' at many different levels – government/province actors, communities, private sector, individuals.</p> <p>Stakeholder participation also allows the project to get views/experiences from other interest groups (Manzungu 2004). In addition, stakeholder/broader participation can be ensured by exploring the possibilities of funds, which can encourage a wider range of participation (Phillips 2000).</p> <p>Where indigenous and other traditional peoples' participation in management has taken place early in the planning process, there have been benefits for both the indigenous peoples and the management authorities (Beltran <i>et al.</i>2000) Kaa-Iya del Gran Chaco National Park and Integrated Management Natural Area (KIGC, Bolivia); and Wood Buffalo National Park (WBNP, Canada).</p>	<p>From the outset, throughout the planning and project design phases, extensive use has been made of input provided by a wide range of stakeholders – from government ministries, through NGOs working in the field, to representatives of local communities. The project is thus firmly grounded and reflects the views of many interested parties. The project planning phase was used very successfully as a mechanism for engaging with and cementing firm and realistic stakeholder support.</p> <p>See the Stakeholder Participation Plan (Section IV Part V) for full details of proposed participation.</p>
<p>The appropriateness of techniques used to engage with participants will have a fundamental impact on the success of the outcomes. (Popa Falls Power EIA, Namibia Calabash Report, 2004)</p>	<p>Extensive use is made of project partners with extensive local experience: INTA's researchers and field agents, provincial agents from production and environment areas, breeders associations and NGOs.</p>
<i>Knowledge exchange and sharing</i>	
<p>Just as this project has benefited from the experience of previous projects, programmes and initiatives, so it is hoped that others may benefit from effective dissemination of the information from this project.</p> <p>Monitoring and Evaluation - continuous process for ensuring that there is some progress, to help managers and to provide some measure of accountability. Will be an increasingly important tool in management effectiveness in the future. (SCBD, 2004).</p> <p>Protected areas database establishment provides essential link to information from multiple sources on PAs and contribute to effective resolution of PA planning at global, regional and national levels (Chape <i>et al.</i> 2003).</p>	<p>A key element of the improvements to systemic capacity involves the creation, and 'institutionalisation' of a DSS.</p>
<i>Partnerships</i>	
<p>This is closely linked to stakeholder participation mentioned above, but takes the concept further. In the context of SLM, it is increasingly understood that government do not have the capacity to manage the system on their own. Partnerships between a variety of actors can help to close the gap between requirements and provision of SLM.</p> <p>Partnership development facilitates the networking process, a process of learning from each other, identifying, discussing and action on common issues (Child <i>et al.</i> 2001; Chape <i>et al.</i>, 2003).</p>	<p>Project implementation is founded strongly in the promotion of existing partnerships, and the creation of conditions conducive to new partnerships. For example, the REPAM will provide an environment in which planning of activities for common issues regarding SLM will be discussed.</p>

Lesson learnt	Project design response
<i>Importance of local expertise</i>	
<p>Careful identification of, and collaboration with local experts can hugely improve the quality and range of information available to project design and implementation teams. Further, it is likely that a two-way exchange will develop, with both sides learning from each other and improving their knowledge. As with partnerships, and participation mentioned elsewhere in this review, involving local experts can be a very effective way of improving buy-in and support for interventions. (SKEP – 1st Phase Report – CI, 2002)</p>	<p>During the PDF-B phase, the project was firmly embedded within the fabric of institutions and other participating actors, and this arrangement will continue into implementation. This allows the project to work extremely closely with highly experienced and committed national and local stakeholders. The participation on national and local consultative committees (like UEPs and CDRs) will improve access to local expertise, and have a positive impact on project direction and activities.</p>
<i>Education and awareness building</i>	
<p>This involves clear explanation of concepts such as Sustainable Land Management, which can mean many different things to different actors.</p> <p>It is closely linked to the idea of participation above, but recognises that, for example in the context of law, by raising awareness of the rationale behind a specific measure, it is likely that cooperation is more likely to occur.</p> <p>Management is more effective where a planned and effective education and awareness programme fully linked to the objectives and needs of the protected area is in place (Dudley <i>et al.</i> 2004)</p>	<p>Under Output 2.1, the establishment and strengthening of organizational structures will increase participation and exchange of information between producers and programs, and under Output 2.2, the implementation of an SITT will make production information accessible by producers.</p>

PART XI List of Ecosystems and Persistent Impacts Associated with Sector Activity

Table 22. Degree of the Main degradation processes by ecosystem type and producers profile (See Map 7 in Maps Annex)				
Ecosystem type	Main degradation processes	Degree and impact	Socio economic profile	Bibliographic references
Sierras y Mesetas Occidentales (Western Mountains and Mesa)	Overgrazing Hydric erosion Aeolic erosion Transitions from <i>Poa ligularis</i> and <i>Festuca grasslands</i> to <i>Mulinum</i> steppes Dune formation	Moderate-severe Desertification LUDEPA (Rio Mayo section) Very severe 4% Severe 22% Moderate-severe 56% Moderate 18% Slight 0%	Neuquén, Río Negro (720 ranches, 86% with less than 1,200 sheep), Chubut (1400 ranches 85 % w/less than 1200 sheep), Santa Cruz. (80 ranches, 40% w/less than 1200 sheep)	Desertification (Del Valle 1998) (Elissalde et al. 1995) Vegetation transitions and ecology (Soriano and Sala 1986, Bonvisutto et al. 1993, Golluscio and Sala 1993, Aguiar and Sala 1994, Austin and Sala 2002) Productive and social aspects (Mendez Casariego 2000)
Distrito Central Patagónico	Overgrazing Hydric erosion Aeolic erosion Transitions from <i>Stipa</i> grasslands to <i>Nassauvia</i> deserts Badlands and dunes	Severe Desertification LUDEPA (Gobernador Gregores section) Very severe 19% Severe 28% Moderate-severe 30% Moderate 22% Slight 1%	Neuquén, Río Negro (736 ranches, 80% with less than 1,200 sheep), Chubut (700 ranches 60% w/less than 1200 sheep), Santa Cruz (609 ranches, 400 of which are abandoned)	Desertification (Oliva et al. 1995) (Del Valle 1998) Vegetation transitions (Soriano et al. 1980, Movia et al. 1987, Bertiller 1993, Ferraro et al. 1999) Productive and social aspects (Borrelli et al. 1997, Andrade 1998, Mendez Casariego 2000)
Monte Austral (Southern Montane)	Overgrazing Hydric erosion Aeolic erosion	Moderate-severe Desertification LUDEPA (Trelew section) Very severe 3% Severe 18% Moderate-severe 54% Moderate 10% Slight %	Neuquén, Río Negro (1,036 ranches, 71% w/less than 1,200 sheep) , Chubut (300 ranches 50 % w/less than 1200 sheep) La Pampa (1,257 ranches, 72% w/less than 1,200 sheep)	Desertification (Del Valle 1998) (Elissalde et al. 1995) Vegetation transitions (Nakamatsu et al. 1993) Productive and social aspects (Mendez Casariego 2000)

Caldenal		Moderate	La Pampa (2,572 ranches, 63 % w/less than 1,200 sheep)	
Monte Oriental (Eastern Montaine)	Hydric erosion Fire	Moderate-severe Desertification LUDEPA (San Antonio section) Very severe 2% Severe 16% Moderate-severe 45% Moderate 19% Slight 18%	Río Negro (550 ranches, 20% w/less than 1,200 sheep)	Desertification (Del Valle 1998) Vegetation transitions Productive and social aspects (Mendez Casariego 2000)
Región P. De Valdez	Overgrazing Hydric erosion Aeolic erosion Loss of grasses in shrub-grass steppes Fire	Moderate severe 35 % Severe 30 % Moderate 25 % Very severe 10%	Chubut (45 ranches, 3% w/less than 1200 sheep)	Desertification (Del Valle 1998)
Región del Golfo	Overgrazing Hydric erosion	Moderate 60% Moderate severe 25 % Severe 30 % Very severe 10%	Chubut (200 ranches, 5 % w/less than 1200 sheep). Santa Cruz (92 ranches)	Desertification (Del Valle 1998)
Matorral de Mata Negra (Mata Negra Scrub Forest)	Aeolic erosion Loss of grasses in shrub-grass steppes of Junelia	High	Santa Cruz (127 ranches).	Vegetation transitions and desertification (Movia et al. 1987) (Oliva et al. 2005)
Estepa Magallánica Húmeda (Moist Steppe)	Transitions from bunch grasslands to <i>Empetrum</i> heathlands Soil compaction	Moderate	Santa Cruz, (22 ranches), T. del Fuego (13 ranches).	(Baetti et al. 1993)
Estepa magallánica Seca (Dry Steppe)	Transitions from <i>Festuca</i> grasslands to dwarf <i>Nardophyllum</i> shrublands Wind erosion Loss of biodiversity	Moderate	Santa Cruz (47 ranches).	Vegetation and soil transitions (Oliva and Borrelli 1993) (Oliva et al. 1998) (Faggi and Roig 1985) (Anchorena 1985) (Boelcke et al. 1985) (Borrelli et al. 1988)

Ecotono Fueguino	Soil compaction Invasion of woody <i>Bolax</i> and <i>Empetrum</i> in <i>Festuca</i> grasslands	Moderate	Tierra del Fuego (35 ranches).	(Oliva et al. 2001)
Wetlands (all the region)	Salinization Compaction Decreased infiltration Increased runoff Overgrazing of rushes and special habitats for fauna (<i>Rallus</i> , <i>amphibians</i>)	High	About 5% of Patagonia are wetlands “Mallines” dispersed in ranches	(Fjeldså 1988, Mazar Barnett et al. 1998, Ayesa et al. 1999, Mazzoni and Vázquez 2004)

(* Same source for every Ecological region.

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PART XII MAPS (Please see separate File)

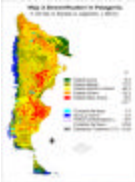
Map 1. Patagonia in South America



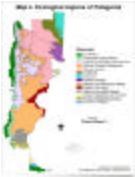
Map 2. Political map of Argentina



Map 3. Desertification in Patagonia



Map 4. Ecological regions of Patagonia



Map 5. Agroecosystems in Patagonia



Map 6. Satellite image of Patagonia



Map 7 Ecologic Regions and Desertification in Patagonia



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