



**STAG**



## **SOLAR LAMBING SHEDS**



## **CASE STUDY IN INDIAN WESTERN HIMALAYAS**



**2008**  
**GERES, LNP, LEDEG WITH**



# SOLAR LAMBING SHEDS

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# INTRODUCTION

The aim of this document is to share the experience of a 4-year project on solar lambing shed in the western Himalayas. It explains the context of the area, the project objectives, as well as the methodology followed, the difficulties faced and the lessons learnt.

It is addressed to anyone interested in rural development issues in the Himalayan region, but particularly to those persons who intend to work on livelihood improvement in such areas.

## 1 CONTEXT OF LADAKH

Remote in the Himalayan hills of the Jammu and Kashmir and Himachal Pradesh states, the valleys of these desert areas lay at more than 3000 m. During the harsh and long winter, the temperature frequently falls below  $-20^{\circ}\text{C}$ . The villages are then isolated for more than six months per year, access passes being closed because of the heavy snowfall. But the area enjoys the benefit of an exceptional sunshine, of more than 300 days per year.

Traditionally, families rely essentially on agriculture and livestock rearing. The diversity of Ladakh allows a specialisation by areas, in the production of wool, cereals, apricots, butter...

Since Ladakh opened, the economy changed and exchanges got monetized. Men more and more migrated from the villages to the cities to earn cash.

Amongst the 250 000 inhabitants of Ladakh, 90% live in rural areas, and 80% with less than 1 dollar per day and per person.

## 2 ISSUES OF BUILDING SOLAR LAMBING SHEDS IN CHANG TANG

### 2.1 Livestock breeding, the main livelihood activity

Chang Thang comprising mostly of nomadic and semi-nomadic (around 80%) herders, live essentially from breeding. Around 3 500 000 sheep and goats are reared in this area.

Herders get their main income from the marketing of pashmina, a long and fine goat wool which raw material costs around Rs.1500 per kg.

### 2.2 High animal mortality

The main cause of animal mortality is the lack of fodder followed by extreme cold and diseases.

Lambs and kits births take place in early spring. At this time of the year weather is still extremely rigorous, and causes high animal mortality. Kits' mortality frequently reaches 50%, especially since births mainly happen during night time which is the coldest period.

### 2.3 A harsh life

Herders way of life is absolutely simple and deprived of basic comfort. Cold is one of the harsh aspects of autumn, winter and spring besides other constraints. Changpas usually warm a room of their small house or their tent by burning dung, bushes or kerosene in a smoky stove. But fuel is limited, and the polluted air causes respiratory diseases (amongst the first causes of mortality in Asia).

Moreover, climate is too cold to grow vegetable, even in summer. Therefore, fresh vegetables are hardly available.

Chang Thang is one of the Ladakh areas most concerned by definitive migrations. In the last 20 years, many families have sold their animals and migrated to settle in Leh area, in search of a more comfortable life.

## **2.4 Side effects**

Some questions that remain on the side effects of the utilisation of solar lambing sheds are:

### **a. Increased pressure on pastures**

If solar lambing sheds contributes to saving animal livestock, then the herds sizes are likely to increase, which in turn could intensify the recurrent problem of pasture shortage. However, it will depend on the herders' strategy, to compensate the mortality reduction by selling more animals.

### **b. Production of low quality pashmina wool**

Another point is the influence on pashmina production. This fine goat wool is generated only in cold climatic conditions. If temperatures are too warm, the animals loose this fine wool and could produce a minor quality one. Anyway, this potential impact is reduced if as planned, only pregnant females, weak and new born animals are kept in the shed and only during night time.

## **3 ACTUAL LIMITS**

### **3.1 Remote areas**

In search of pasture and water, herders are settled in a very scattered manner on the vast plains of Chang Thang. Many places are not accessible by road, and almost inaccessible during winter and spring. Therefore it is difficult for the NGO to work in certain areas where transport of material is problematical, and which are not accessible in spring, to follow up the activities during the kitting and lambing period.

### **3.2 Lack of masons**

In this nomadic region there is no tradition of building houses( as they live in “rebos”or tents made out of Yak skin) and as such there are few masons. Basic skills are required for the construction of a shed.

These two limitations concern mostly the nomadic groups who are always on the move. Therefore during the four years of the project, it has been proposed to work with semi-nomadic populations. In this context, lambing shed utilisation is more intensive because part of the family often lives on the lambing shed place, and uses it advantageously outside the kitting and lambing period for other purposes. Moreover, these places are more accessible.

## **4 PROJECT OBJECTIVES**

### **4.1 Income generation**

The main objective of the project is to facilitate shepherds family to improve their livelihood and increase income from their herd by reducing animal mortality.

### **4.2 Improvement of living conditions**

Specific objectives of the project are to improve living conditions of the Changpas, thanks to the multiple utilisations of the shed out of the kitting and lambing period.

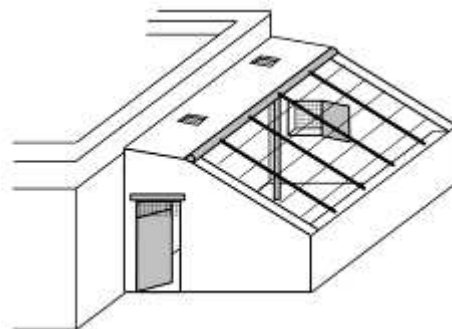
## 5 SOLAR LAMBING SHED DESIGN

### 5.1 An adjustable design

According to the situation, lambing shed can be constructed attached to the main habitation, separate, with or without roof.

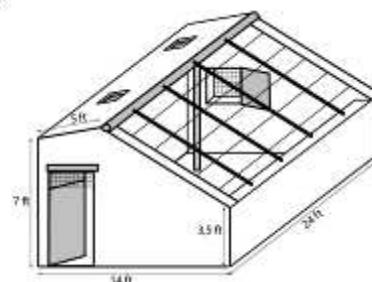
#### 5.1.1 Attached (20%)

When kitting and lambing periods take place when herds are near the main habitation, the shed can be built attached to the house, if its orientation is suitable (South  $\pm 30^\circ$ ). In this case, the shed as an attached greenhouse which also contributes to warming the house.



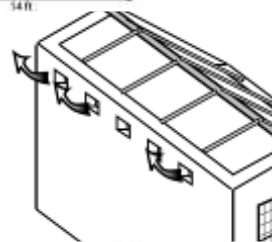
#### 5.1.2 Separate (20% isolated, 60% near the habitation)

If the house architecture is not suitable to build an attached shed, or if the lambing and kitting period happens when animals are far from the village, the shed is built as a separate building.



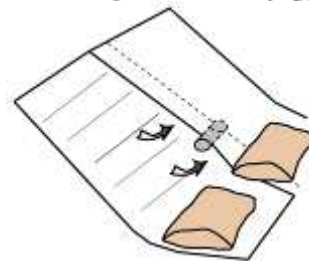
#### 5.1.3 With or without roof

Most of the promoters prefer to build a shed with a roof, which allows a better fixation of the polysheet and an efficient top ventilation. However, in some case, beams and twigs are not available in the area and difficult to transport, therefore some prefer to build without a roof. An additional ventilation is then required, that can consist of apertures in the upper part of the back wall.



#### 5.1.4 Experimentations

Another ventilation system is being experimented, with a polysheet split in three parts. To ventilate, interstices are created by the insertion of a block between two sheets.



Moreover, an integrated vegetable greenhouse-lambing shed is also experimented. A section of the greenhouse is dedicated to growing vegetables, the other section is used to keep animals during night time. Daytime, temperature is appropriate for growing vegetables, and the presence of the animals at night warms the space and prevents the vegetables from freezing.

#### 5.1.5 Size

Size of the shed is determined according to the number of animals in the herd, the type of animals and the family needs. 4 sqft should be available per animal kept in the shed (this ratio is augmented if there are more sheep). In a 12x24ft shed can be accommodated 60 to 80 sheep and goats.

### 5.2 An appropriate technology

#### 5.2.1 A simple design participatively improved

The design has been progressively improved thanks to herders' feed backs and suggestions, keeping in mind the objective of making an efficient and low cost building. The construction requires only basic mason skills, and any local mason is qualified for it.

### 5.2.2 Material locally available

80% of the material requested is available locally, and door, window and polysheet are available in the nearest market, in Leh. The total price results around 16000 Rs, and promoters can manage half of the expenditures.

<i>Material</i>	<i>Quantity</i>	<i>Costs estimation*</i>
Stones	300	600 INR
Bricks	1000	2 000 INR
Door	1	2 100 INR
Window	1	1 450 INR
13ft ballies	4	1 600 INR
Pole to sustain the roof (5 ft)	1	100 INR
Twigs (12 to 15 ft)	60	1 020 INR
Polysheet	1	1 300 INR

\* according to prices in Leh, Ladakh in 2007

Mason	6 days	1 500 INR
Unskilled labour force	2x10 days	2 600 INR
Eventual transportation of material		1 200 INR

## 6 METHODOLOGY

### 6.1 A gradual introduction

A previous project on lambing shed with Aptibet took place in 2001, with the participation of LNP and GERES, and few lambing sheds have been built. However the semi-underground sheds failed to become popular amongst the population because the Chang Thang soil is hard and hence digging it proved to be an expensive and laborious exercise.

The project first started in 2005 in one area, with one ONG, as a pilot experience. The second and third year, 2 NGO have implemented it in a progressively in a number of villages.

<i>Village</i>	<i>Number of LS built in 2005</i>	<i>Number of LS built in 2006</i>	<i>Number of LS built in 2007</i>	<i>Total number of LS built</i>	<i>Supporting NGO</i>
Barma		2	4	6	LEDEG
Khira pulu		2	4	6	LEDEG
Chibra (Chang Ta			4	4	LEDeG
Sato			4	4	LEDeG
Koyul		5	8	13	LNP
Sumdo		5	8	13	LNP
Ribi Sumdo			2	2	LNP
Tsaga	2	10	4	16	LNP
Demjok			8	8	LNP
<b>TOTAL</b>	<b>2</b>	<b>24</b>	<b>46</b>	<b>72</b>	

## **6.2 Area selection**

### **6.2.1 Area**

Lambing shed project focus the highest part of Ladakh, called Chang Tang, where inhabitants live mainly from livestock rearing, on a nomadic and semi nomadic way, and keep their in open sheds.

### **6.2.2 Village**

Selection of the villages is based on the following criteria:

- Importance of livestock rearing in people livelihood
- Villagers interest to implement the project
- Availability of masons in the area
- Availability of basic raw material (mud, stones) and accessibility to transport construction materials.
- Clusters of villages for easier monitoring/ follow-up.

### **6.2.3 Site**

Then, the place of construction of the shed is crucial. Herds follow a seasonal grazing pattern, and the shed should be built at the sheep and goats delivery place. If this place corresponds to herders' main settlement, the shed will be used the whole year through, for different, purposes, and impact will be major.

Technical criteria described below permit to elect a suitable site for construction.

## **6.3 Promoters selection**

### **6.3.1 Process**

Field workers first meet village representatives and explain in detail the project objectives and methodology (design, criteria, and contribution). Then, if collaboration is envisaged, they organise a village meeting on the same day, or fix a suitable date accordingly. The objectives of this meeting with all villagers interested are:

- To share past experience on lambing shed
- To explain the objective of the project
- To present the designs and costs of the shed
- To explain criteria for promoters selection
- To explain project and promoter contribution
- To collect names of interested villagers

The long list is finalised with the detailed information as norms laid down in the criteria in presence of all the villagers.

Then shortlist is done by exclusion of the persons who do not fall under project selection criteria, in presence of villagers. If some information found are wrong or if somebody has any objection, it is sorted out with the villagers and the Goba (traditional head of the village)

When the short list is finalized, construction sites of each promoter are visited, to check technical feasibility and to complete the collection of data about the family. If the site is found not suitable as per technical criteria, an alternative site has to be found, or the candidature is rejected.

Once promoters selection is finalised, a resolution is signed by each promoter and the NGO, remembering the engagement of each side. In new areas, a exposure visit of promoters to see previous lambing shed and discuss with owners can be organised.

## Construction

Then the construction is planned, and promoters are advised to gather the material necessary and provided with a design of the shed. NGO makes necessary arrangement for organising the provision of the other materials. As winter arrives very early in these high altitude areas, construction period is short, from July to September. Excessive delays could postpone the construction to the following year. When delivering the material, field workers provide advice for the construction to masons and promoters. They also draw with them the shed foundations line, to ensure a suitable south orientation.

Field workers monitor the construction in the course of it, and discuss adjustments if necessary. After completion of the work, a UV resistant polysheet is issued.

## Follow up

The next field visit is to assess the impacts of the utilisation of the shed. Herders using solar lambing sheds and herders without are surveyed, to assess the mortality in both cases and evaluate the mortality reduction brought by the shed utilisation. Wider questions are also made, to assess other impacts of the shed, on health, handicraft production, hygiene and reduction of fuel consumption. To collect relevant data, at least two follow up are recommended, one during the lambing and kitting period, and the other when it is finished.

## Implementation timelines

Year I												Year II				
J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M
		Promoters selection				Construction								Follow up		
																Promoters selection

### 6.3.2 Main criteria for promoter selection

Social and technical criteria have been determined to guide the promoter selection.

The process is slightly different if lambing shed are known or not in the area. If not, the first year, social criteria are more flexible, the more important being to find people interested and able to manage a proper construction and utilisation of the shed. Technical criteria keep being very important. The aim is in fact firstly demonstrative, to introduce a proper example of the sheds in the area.

Then, when some lambing sheds exist (2 in Tsaga), villagers get aware of the benefits of such a shed, and the demand increases. Social criteria are in this case strictly applied.

- Social criteria

Social criteria have been determined to select promoters, in order to target the more needful households, that are mostly depending on livestock and for whom constructing a lambing shed is a major issue.



The project targets vulnerable households, that earn less than 0,7 euro per capita and per day. It has been estimated that such households possess less than 30 sheep and goats per head in the family.

The global revenue of the family is considered, if extra pastoralism incomes are perceived. Possession of a commercial vehicle is an exclusive criteria, because it testifies a higher level of social and economic welfare.

As the major impact expected from the construction of lambing sheds is the diminution of the mortality rate of kits and pregnant female, the impact will be more significant for families that are essentially dependent on livestock rearing. Therefore, it has been considered that under a certain number of animals, the construction of a lambing shed is not relevant, because of the limited number of lambs and kits concerned. The limit of 60 animals has been decided.

Following these criteria, it has been estimated that around 50 % of Chang Thang pastoralist population are concerned by the project.

- Technical criteria

Soil: Soil humidity should be considered carefully as some places seem suitable in summer, but are marshy in spring and this causes the collapse of the building.

Shade: The shed should be situated in such a place where there is no obstruction from direct light (caused by a building, trees...), and winter sun duration should be more than 6 hours.

Availability of raw material/accessibility: Stones and mud, or mud and cement should be available on a suitable distance from the site, and site should be accessible to bring other required material from the nearest market (door, ventilator, beams and twigs if necessary).

Presence of water nearby is also necessary for the construction.

Social Criteria:

- Per capita income should not exceed to Rs12000/-
- Should not exceed 30 Nb of Sheep/ Goat per head
- Not less than 60 animals
- No commercial vehicle

Technical criteria:

- Sun duration at least for 6 hours.
- No marshy land
- No shadow on south side.
- Construction materials like stones, mud etc need to be available on the site or accessible by vehicle.

## 6.4 Capacity building

The project focuses also on capacity building of the locals as well as of the NGO.

### 6.4.1 Local capacity building

Local masons are trained to build this type of constructions, which makes direct replication possible either by villagers or by following projects.

Masons are trained during the construction, by the NGO fieldworkers. Practically, around 1 mason for 3 lambing sheds constructed have been trained.

#### 6.4.2 NGO capacity building

Local NGO, have been supported in the management of the project implementation. Intervention methodology has been jointly set up, from data collection to practical implementation, impact analysis, reporting and communication of the results.

### 6.5 A shared contribution

Project investment has reached 50% of the total cost of a shed. A relevant contribution has been requested from the promoters as it ensures their interest and motivation and hence sustainability of the project. If they decide to build, it is because they find it relevant and they will then do the necessary to maintain it. This logic would be biased for a highly subsidized shed. However, a subsidy is necessary to allow poor families to have access to such livelihood enhancement, which they could not afford by their own.

In fact, order and transport material from Leh is complicated and expensive, and it was apparent that no simple family from Chang Tang could start it on his own.

It has been decided that the project will subsidize the material that is not available on the spot, such as door, polysheet and wood, and that promoters will contribute by providing mud bricks, stones, and labour force.

Another point to consider is that Ladakh is a highly subsidised area, by the central government (through programs as watershed) as well as by foreign NGOs (with relief programs, students and schools sponsoring...). As such this creates and increases the expectations from the population, who hardly invest on his own in a tool which is likely to be subsidised in the future. Therefore it seems that solar lambing sheds, despite its success amongst the population, can hardly be replicated by the local population. But this experience of lambing shed development is sustainable if population consider and express it as a important issue, and if other projects continues to support it,.

### 6.6 Wide sharing of experience

Project was started by a meeting gathering people working in Chang Tang area, NGO, Indian government and Tibetan government representatives, as well as foundations planning to work there. The aim was to inform about the project, present the objectives, share the different experiences and projects in the area, and find out about more relevant places to work.

Before the end of the project, a second meeting with government and administration representatives in charge of the area aimed to present the results of the project and discuss about future collaborations.

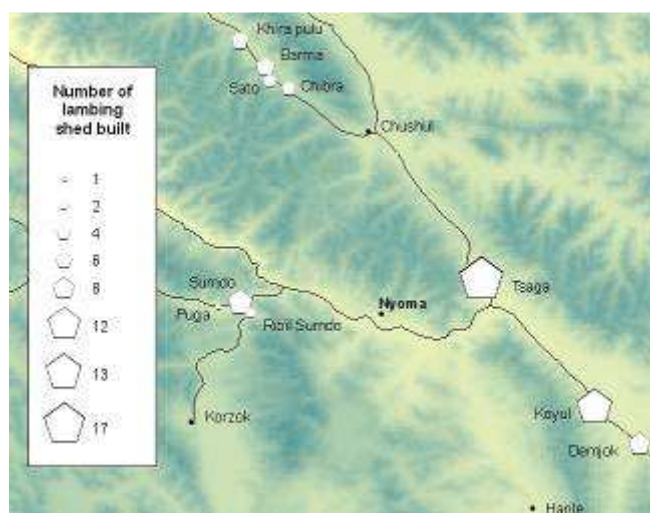
## 7 RESULTS

### 7.1 Implementation

In three years, 73 lambing sheds have been built (71 in two years), in 10 different locations of Chang Tang.

Three field workers were involved, part time on this activity, to organise and implement the project with support from GERES

Year	Number of lambing sheds built		
	LNP	LEDeG Leh	Total
2005	2	-	2
2006	20	4	24
2007	31	16	47
<b>TOTAL</b>	<b>52</b>	<b>20</b>	<b>73</b>



### 7.2 Mortality reduction and income generation

#### 7.2.1 Mortality divided by two

By surveying herders who use lambing sheds and who do not, it has been possible to compare the different mortality rates.

Type of shed	Kits mortality	
	For night birth	Total (for both night and day birth)
Traditional shed	50%	40%
Solar shed	20%	20%

These data, collected for kits, lambs and adults, seek to evaluate the number of animals saved thanks to the utilisation of the lambing sheds. The table below indicates the estimation of the animals saved thanks to the first lambing sheds built with the support of the project.

	2005-6	2006-7	2007-8
Remarks	Normal year	Shortage of pasture and modification of the grazing pattern	Normal (expected)
Number of sheds	2	24	73
Lambs and kits saved	90*	197	712 (estim)
Adults animals saved	NA	31	101 (estim)
Number of lambs and kits saved per shed	45*	8	10 (estim)

\* this data may be not precise as based on the only 4 surveys available.

### 7.2.2 Family income increased by 15%

According to baseline surveys, Rs. 50 000 can be considered as a standard yearly income of Chang Thang herders families. Moreover, the value of a kit saved has been evaluated to Rs 600 and of an adult to Rs. 2000. (2000 Rs is an average of the current selling prices of an adult female, and Rs.600 has been fixed by local resource persons, considering jointly the mortality probability of a kit and its value on the market)

According to this data, we estimate that a solar lambing shed allows a promoter to increase his family income by 15% annually.

Nb of animals saved	Value of animals	Total value
197	600	118 200
31	2 000	62 000
		180 200
Average income generated per family		7 508
Increase of the yearly income (50 000Rs)		15%

### 7.2.3 A pay back period inferior to 2 years (à formaliser par Marie ?)

Cost : 16 000 Rs

10 kits can be saved per year. Considering only the value of pashmina, that represents not less than 8500 Rs after 2 years, 17 000 Rs the following year (with two generation of animals producing pashmina) and so on.

## 7.3 Multiple joined impacts

When the shed is built close to the main habitation of the herders family, it can be defined as an integrated solar polyshed. Actually, apart from being used for the animals during kitting and lambing period, the lambing shed can have other multiple utilisations, which improves herders' daily life.

### 7.3.1 Health and hygiene improvement

The lambing shed procures to the families a warm room that is free of smoke. In Ladakh, lung diseases, mostly due to the smoke from the local stoves used to warm the house is the second cause of mortality. During daytime, when animals go for grazing and out of the lambing and kitting period, herders' families use the shed for other purposes. The solar shed offers a warm place for bathing, staying, washing clothes, etc. Owners of lambing sheds state that because of the lambing sheds they were able to improve both their personal hygiene (57% of the promoters mention it) and health (71% of the promoters mention it).

### 7.3.2 Nutrition improvement

After the lambing period is over, lambing shed can be used as a greenhouse to grow vegetables. Soil is fertilized by the animal dung, and hence is particularly suitable for growing vegetables.

Different promoters have successfully experimented this during last year summer. They could get leafy vegetables for their family consumption, and some have also started to market part of them and to generate a small complementary income (400 Rs for the first year experimentation)

This is a particularly beneficial activity in an area where summer season is very short and where it is not possible to grow vegetables in plain field.

### 7.3.3 Increase of handicraft production

As houses and tents are small, handicraft activities are traditionally done outside. However, wind and cold limits the time for this activity to a few hours not every day. As an alternate option the solar shed provides a warm and bright space during day time. Thanks to it, many families have more than doubled their handicraft production. Till now, this production is essentially for the family utilisation and is not marketed.

### 7.3.4 Respect of the environment

Thanks to this warm solar shed, herders use less wood, bushes, dung or kerosene to heat their house. The destructive and difficult task of wood, bushes or dung collection in this desertic area is therefore reduced. Moreover, fuel combustion and consequently CO<sub>2</sub> emission are slightly reduced (in average In average, 1100 kWh are saved per family, in bushes, fuel wood, kerosene or dung thanks to the utilisation of the shed during 2 to 3 months)

## 7.4 A prepared exit strategy

### 7.4.1 Maintenance of existing sheds :

Till now, after 3 years of the project, we observed that the maintenance required by the shed has been low, and similar to the maintenance of the herders own habitation. Sheds with roofs can require more maintenance, with the replacement of part of the roof that could be damaged.

The main maintenance step will be the polysheet replacement, that will be necessary when the first one will get torn (after 5 to 10 years). It is clearly explained by the NGO to the promoters, that when the lambing shed is built, it is the promoter's responsibility to maintain it, and to buy a new polysheet when the one provided initially will be damaged. Fieldworkers care of the promoter awareness of polysheet availability in Leh market.

#### 7.4.2 Extension

After the end of the project, needs and demand from the population will still not be met. However, local masons are now trained to construct these solar lambing sheds, and local NGO are able to seek for funds, to implement a similar project and to answer to funders' exigencies.

Contacts have been taken with local authorities and programs going to work in the area, who could be interested to go further and prolong this experience.

Required conditions to extend this project on other sites would be:

- Relevant area (breeding activity, climate...)

- Potentially interested population by the construction of lambing shed

- Availability of material and accessibility of the area

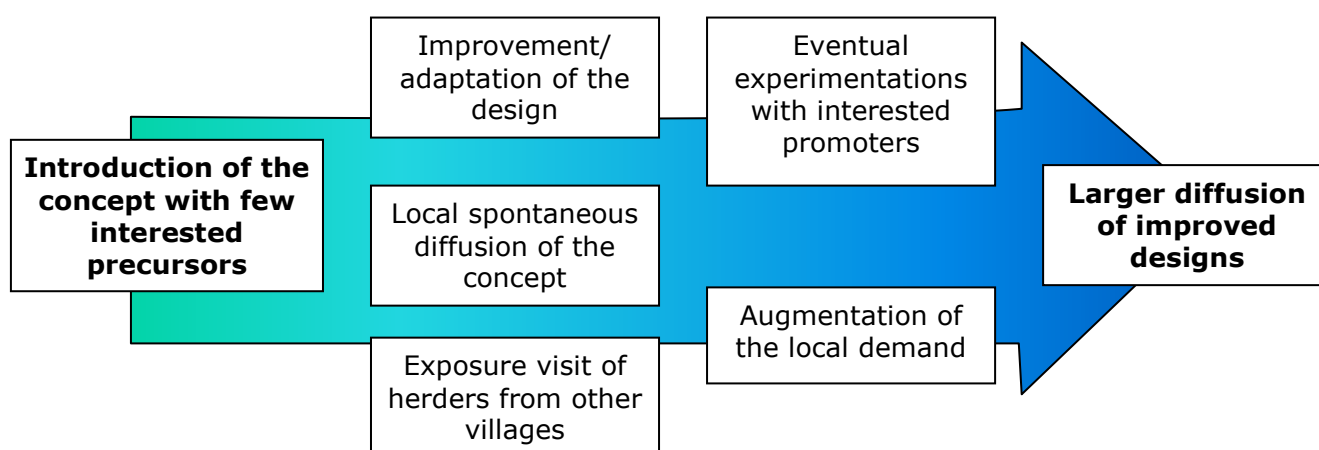
- Availability of masons

Investment of the population, with or without subsidy : From our experience, investment has not been a critical point, as promoters contribution consisted mostly in material locally available and labour force. However It seems not possible in the Ladakh context, but the question of the subsidy should be reevaluated for a similar program in another place.

## 8 LESSONS LEARNT

### 8.1 A progressive appropriation

This concept of shed is new for most of the herders, and they may not be immediately interested by it. As per the project experience, the first year of intervention in an area, it happens that very few herders are interested by building lambing sheds. But after one season, villagers see the benefits that it brings, and this motivates many of them to build.



### 8.2 Community involvement

Herders' implication in the improvement of the design has been a key point of the adaptation of the shed to their needs. Their contribution sought to abandon the semi underground shed

for a ground level one, to improve the ventilation system, make the shed more secure from predators by covering the apertures with mesh.

Besides, criteria for promoters' selection, that the project had fixed to target the more marginalized families, has to be discussed with the community from the beginning. In fact, there may be locally other rules to share the benefits of a project, which may not be suitable for a proper impact of the project. A turn by turn or a lottery system may attribute subsidies for a shed to a well-off family who do not need it or who do not have a relevant number of animals... Therefore, in order not to create tensions, it is important to explain clearly the conditions of work of the project.

### 8.3 Local authorities involvement

Information and dialogue with local authorities and other stakeholders working on related topics in the area is essential for proper coordination, efficiency and sustainable work. It may be arduous, as means, logic of intervention and availability may not match, but it is worthwhile to try.

In this project, a first meeting has been held, with the different organisation working in Chang Thang, Ladakh Autonomous Hill Development Council( LAHDC), Chief Representative Organisation (CRO), TATA foundation and local NGOs. The aim was to share the experiences and knowledge of the area of the different participants, to explain the project to be started, to consider the future actions in the area, and to decide the priority areas for intervention.

A second meeting has been organised with government representative at the occasion of the mid term review workshop. The restitution of a mid term evaluation by an external consultant has then been the occasion to discuss informally the project advancements and possible collaborations with the government.

A formal meeting has been held after three years of the project, with representatives of the government departments involved in the area and of Chang Tang administration, to present the results achieved and to discuss future collaboration more concretely.

### 8.4 Human resources (to precise in 2008 with the resource NGO)

In the context of this project, a field worker working XX % of a full time, involved principally in spring and summer (cf. table below) can take care of the construction of XX lambing sheds.

Year I												Year II				
J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M
		Promoters selection				Construction								Follow up		
														Promoters selection		

The cost of a project implementing 20 lambing sheds per year (it is closely linked to the distances, the cost of salaries and material) is evaluated to (in euro) :

Explanation	Number	Cost	Total
Salary 50% field worker	1	200	100
Transport	8	650	5200
Material	20	100	2000
Administration			
			7300

### 8.5 Replicability

From this experience in Ladakh, some criteria that emerged to define areas where such a program, of lambing and kitting sheds are relevant:

- Lambs and goats rearing area
  - High animals mortality due to cold
  - Availability of material (mud, stones, wood, polysheet – if similar design)
  - Availability of masons
  - Accessibility of the area where lambing and kitting occurs
- } → Interesting pay-back period

### Conclusion

Solar lambing sheds, which could also be called integrate solar polysheds, represent an important issue to improve livelihood of high plateaux herders of the Himalayas, as well as of all mountain populations living in similar conditions.

This four-year experience in Ladakh has sought to set up with the inhabitants an adapted technology, and to elaborate an intervention methodology and to strengthen the capacities of the two NGO in the management of such programs.