

# Explorative agricultural study of Shangrila project villages in Jumla and Mugu District, Western Nepal

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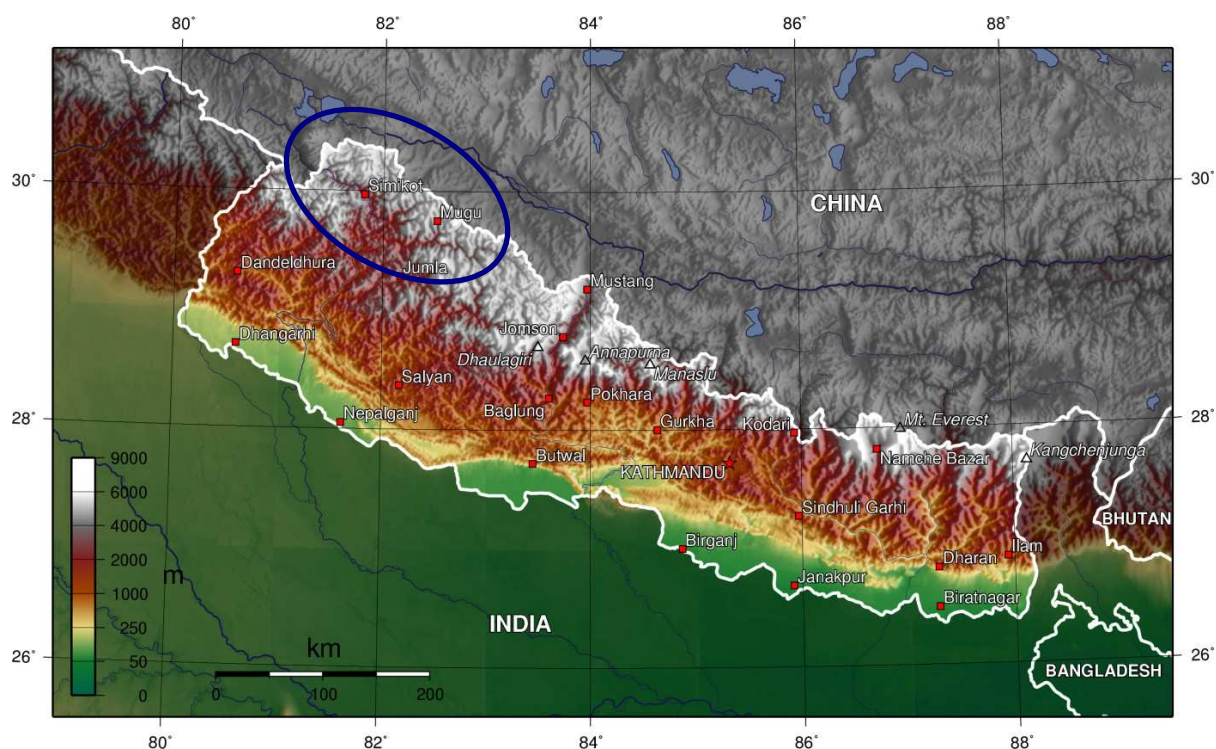
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Map of Nepal. The Karnali zone is marked with a blue circle.

Source: [www.wikipedia.org](http://www.wikipedia.org)

# 1. Introduction

Famous for its natural beauty, high mountains and known as “top of the world”, Nepal is also one of the world’s poorest countries according to the UN statistics. An HDI-value, including life expectancy, literacy rate, enrolment ration and purchasing power parity (Human Development Index) of 0.534 in 2005, gives the country a rank of 142<sup>nd</sup> out of 177 countries. ([United Nation Human Development Reports 2007/2008](#)).

But even within the young republic there are distinct differences in living standard, infrastructure and development. The Karnali zone, located in the Mid-Western Region is Nepal’s remotest area. The five districts, Jumla, Mugu, Humla, Kalikot and Dolpa, geographically connected by the Karnali river, harbouring sub-tropical, temperate, sub-alpine and alpine zones, are characterised by remoteness and underdevelopment. This situation is reflected by the National HDI ranking, where the mentioned districts are ranked lowest. (Humanity Plundered in Karnali, 2005).

Factors and symptoms of the dramatic situation of the Karnali zone can be found in all sectors: education, agriculture and food supply, communication, health-, transport- and general infrastructure.

The absence of a proper road, for instance, connecting the Karnali Zone with other regions, is one important bottle neck. Required commodities and goods have to be imported by small airplanes, meaning low logistic capacity, comparatively higher prices and poor access to markets.

95 % of Karnali’s people work in agriculture, but the produced food suffices for only 6 month per year on average. The mountainous topography and harsh climate of the study area are bad conditions for the national main staple rice.

This situation causes malnutrition of 74 % of the children and a very low life expectancy, in Mugu for instance 36 years. An illiteracy rate of 75 % reflects the educational misery.

Since 2006, the German development aid association Govinda e.V.

([www.waisenkind.de](http://www.waisenkind.de)) and its Nepalese partner organisation Shangrila, try to improve the living standard of 3468 people in 8 project villages, located in Jumla and Mugu district. With different short- and long term programmes, like medical camps, training programmes and the introduction of a micro-credit-system, Govinda e.V. attempts a holistic and sustainable support for the communities.



Picture 1: People waiting for rice supplies at Jumla airport.

## 2. Aim of this study

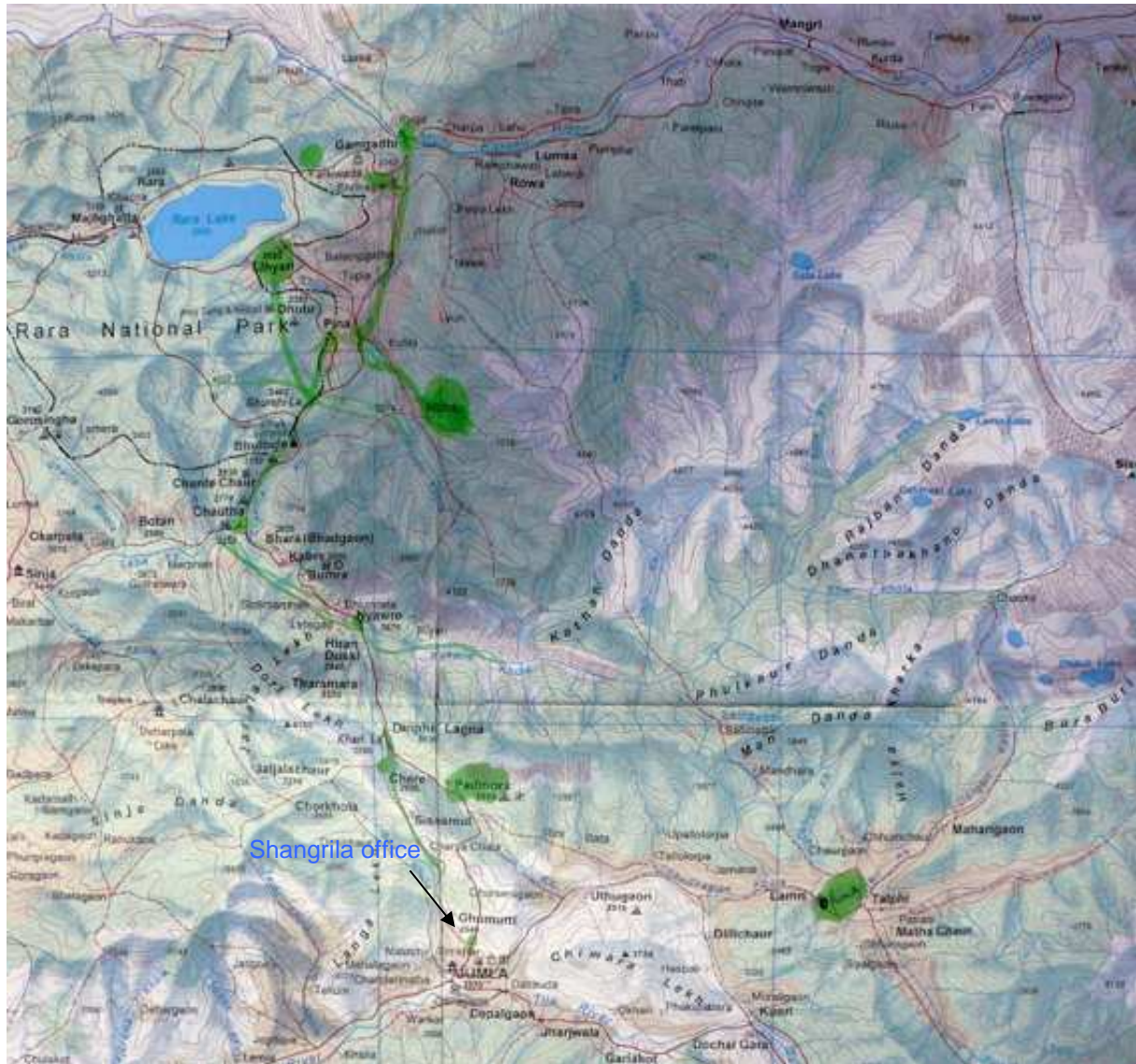
Since almost all people of the Karnali zone are involved in agriculture, and food production harbours a lot of problems while only little agricultural information of Nepal's Mid-Western Region is available, the two partner associations wanted to evaluate the agricultural situation and identify the main problems to get a basis for planning future projects. Therefore an explorative agricultural study was done in August/September 2008 in 6 project villages of Mugu and Jumla district.

The gathered data and information were inquired with qualitative methods during a respectively short period of one month.

Due to this, it may be stressed that there is no claim of scientific standard and objectivity!

This report is written for Govinda e.V. as basis for further decisions and projects. But it is also written for people interested in the situation and development work of the Karnali zone.





Map of the study area: north of Jumla district and south of Mugu district. The project villages are marked with green colour.

### 3. Methods

*Participative observation* (Flick, 2002; Girtler, 2001) was used to get a first impression of the agricultural situation and related problems. This method allows getting familiar with the environment, the everyday life and culture, as well. To gather more specific information, *semi-structured interviews* and *group meetings* were conducted (Flick, 2002; Girtler, 2001; Bechstedt, 2000). That approach allows meeting the problems as seen by the villagers, being the local agricultural experts and the centre and reason for development projects.

*Participatory Appraisals* (PRA) are useful methods to gather information efficiently in a (very) short time period by participation of the local peoples. (Schönhuth u.

Kievelitz, 1994; Theis u. Grady, 1991; Bechstedt, 2000)

As PRA -tool, seasonal calendars were set up together with local key-persons. Further PRA-tools were made by the KTS (Karnali Technical School) students during the out-reach programme, taking place in September 2008 in the 4 project villages of Mugu district.

The soil evaluation was conducted according to the “Praktikumsanleitung zur Beschreibung, Deutung und ökologischen Bewertung von Böden” (Stahr, Herrmann, Jahn), which is available at the Department for Soil Science, University of Hohenheim, Germany.

## **4. Background information**

### **4. 1 Govinda/Shangrila programmes; project villages**

As already mentioned in the introduction, the Karnali zone is the remotest area of Nepal and most of Shangrila orphans' (SOH) derivation. To not only fight the results of underdevelopment (orphanage) but get to the roots, Govinda / Shangrila started several programmes in western Nepal.

The *Shangrila Community Based Integrated Development Programmes* (SCIDP), consisting of different sub-programmes and projects, contains short term support, like medical camps, and also long term programmes, like trainings to reach a sustainable improvement of people's living standard.

*Shangrila Sustainable Development Programme* (SSDP) introduces a micro-credit system by building cooperatives.

In cooperation with the Karnali Technical School, located in Jumla, the *Out-Reach Program* was established. Students stay every year for four weeks in the project villages to teach the villagers in agriculture, health and construction, and apply at the same time their new knowledge and skills.

Govinda / Shangrila operates in four villages in Jumla and four villages in Mugu district. All villages can be reached only on foot. To reach the villages in Mugu, it needs a two day walk from Jumla market. The other villages in Jumla can be reach in about four hours.

For detailed information please visit the Govinda homepage: <http://waisenkind.de>

## 4. 2 Climate

In Jumla market there is a small weather station belonging to Ministry of Environment, Science and Technology. An assistant measures rainfall, temperature, humidity, wind force and direction and sunshine hours on a daily basis. The collected data is noted on a form and the central weather station in Surkhet is informed by radio communication.

From the weather station only daily data is available. The central governmental meteorology office was contacted to get data of Jumla's macroclimate, meaning average values of the last 30 years. Unfortunately, that office provided only annual climate data. In the annual report of the NARC in Jumla climate data are also available and are used as a source (Table 1)

Generally speaking, the climate of the Karnali zone is characterised by a monsoon-affected rainy season, starting from July until September, and a dry season, with little rainfalls. Since the monsoon's humid air is coming from east, the Karnali Zone is in the "rain shadow" of the Himalaya, meaning relatively few rainfall. Even during rainy season. Mean annual precipitation of Jumla is between 800 to 900 mm/year.

Due to the altitude (Jumla: 2300 masl), temperatures are temperate with an annual mean temperature of about 13 °C. Maximum summer temperatures are about 30 °C, whereas in winter minimum temperatures of -8 °C are common. The altitude also causes significant daily temperature-differences, with a difference of more than 15 °C, from day to night.

**Table 1: METEOROLOGICAL DATA OF ARS, JUMLA (ALTITUDE 2290 MAMSL) 2006/2007.**

Months	Temperature °C			Absolute & Extreme Temp. °C				Rainfall		Absolute total rainfall (mm)				RH %
	Max	Min	Mean	Max	Date	Min	Date	# Day	Total	Max	Date	Min	Date	
July ('06)	25.6	16.57	21.05	30.5	7 <sup>th</sup>	13.8	30 <sup>th</sup>	25	225.21	34.0	17 <sup>th</sup>	0.3	6 <sup>th</sup>	78.91
August	25.7	14.99	20.34	27.0	21.22 <sup>nd</sup>	11.5	10 <sup>th</sup>	26	232.1	32.8	2 <sup>nd</sup>	0.4	15 <sup>th</sup>	77.71
Sept	26.23	12.8	19.51	27.8	29 <sup>th</sup>	8.6	30 <sup>th</sup>	12	66.8	16.7	19 <sup>th</sup>	0.2	1 <sup>st</sup>	NA
Oct.	22.9	4.1	13.5	27.4	3 <sup>rd</sup>	0.2	29 <sup>th</sup>	6	12.4	4.0	22 <sup>nd</sup>	0.2	31 <sup>st</sup>	57.8
Nov.	19.05	-0.51	9.27	22.9	1 <sup>st</sup>	-6.5	26 <sup>th</sup>	5	23.2	10.0	3,8 <sup>th</sup>	0.2	1 <sup>st</sup>	55.0
Dec.	17.73	-2.95	7.14	21.2	3 <sup>rd</sup>	-6.0	23 <sup>rd</sup>	-	14mm Sprout	-	-	-	-	52.43
Jan. 07)	16.5	-5.82	5.34	21.0	26 <sup>th</sup>	-8.5	11 <sup>th</sup>	1 <sup>st</sup>	1.4	104	1 <sup>st</sup>	-	-	50.9
Feb.	14.1	1.3	7.7	21.1	1 <sup>st</sup>	-5.1	18 <sup>th</sup>	Rain-6 Snow-2	Rain44m Snow11c	Rain23.5. Snow8cm	Rain14 Snow14	Rain0.1 Snow3	Rain-11 Snow-12	61.44
March	17.9	0.7	9.3	25.8	31 <sup>st</sup>	-3.5	7 <sup>th</sup> , 16 <sup>th</sup>	Rain-7 Snow-2	Rain117.8 Snow11cm	Rain4.2. Snow8m	Rain13 Snow13	Rain1.5 Snow3.0	Rain15th Snow2nd	55.38
April	23.9	4.9	14.3	26.7	27 <sup>th</sup>	2.0	10 <sup>th</sup>	6	24.0	5.9	25 <sup>th</sup>	0.2	27 <sup>th</sup>	55.9
May	24.5	8.7	16.6	26.9	21 <sup>th</sup>	5.2	30 <sup>th</sup> , 31 <sup>st</sup>	15	55.8	12.2	5 <sup>th</sup>	0.2	12 <sup>th</sup>	59.54
June	26.75	13.62	20.18	29.4	25 <sup>th</sup>	7.3	1 <sup>st</sup>	10	78.1	29.0	9 <sup>th</sup>	0.2	10 <sup>th</sup>	69.61

NA= Not Available

Source: Meteorology Division, Jumla, 2007

## 5. Results

### 5.1 General results

One goal of this study was to get information about the present infrastructure, which is important for agricultural development.

The fundamental main obstacle for the development of Jumla and Mugu is the absence of a proper road, connecting the district's headquarters with the logistic junction Nepalgunji, located in the Terai region. Only a small trail, actually insufficient for vehicles and thus transportation, connects Jumla market (headquarter) with the southern Suhrket. Thus, almost all needed commodities have to be imported and exported by small aeroplanes, displaying the bottle neck for transportation, trade and bad access to markets.

This situation causes a high dependency and vulnerability of the local markets and effects the prices. In general, all imported national goods and food are more expensive in the Karnali zone whereas people's income is lower. It is common that distinct goods, like rice and flour, are scarce or not available, at all.

But also the locally produced commodities, like apples, wool and medical herbs, can only be exported in small amounts, thus the agricultural potentials and development are constrained. Every day in the corresponding season, there are farmers at the airport, waiting for an aeroplane to transport their harvest - often in vain.

Summing up, Jumla's and Mugu's development is blocked by their poor access to markets.

Another impression of Jumla was the high presence of numerous NGOs. Local people and officers mentioned that they sprang up like mushrooms over the last years. One soft spot of this development is the missing transparency and communication between these organisations. It would be very beneficial if the present NGOs knew about each other, of former and current projects, and shared informations.

This is also important since the people of the project villages often do not report about other former and current projects.



## 5. 2 Institutions

In Jumla market six governmental institutions, important for agriculture, are found:

- I. The agricultural Research station of the National Agricultural Research Council (NARC)
- II. The Agricultural Development Office
- III. The Veterinary station
- IV. The Forestry Office
- V. The Botany Office
- VI. The Karnali Technical School (KTS)

Each institution was visited and researchers and officers were interviewed. Questions about their functions, current projects and their opinion of local development problems were put. All officers were kind and willing to help. They were also aware of the problems in agriculture and about possible approaches and strategies to overcome them, but often they mentioned their sub-optimal working conditions and the stubborn behaviour of the local people. The fact that all officers are sent to Jumla against their will and separated from their families affects their motivation and quality of work, naturally.

I. NARC, Mr. Mahesh Lal Vaidya, Agricultural Research Station, Vijayangar, Jumla

The Agricultural Research station of Jumla is a branch of the NARC headquarter, located in Lalitpur, Kathmandu valley. It is mainly focused on plant breeding, providing cold and disease resistant cereals and legumes varieties. There is also an Annual Report available, containing the research results and giving an overview of NARC activities and objectives. One outcome, for instance, was a blast disease resistant rice variety.

But also participatory training programmes for farmers were conducted, like food processing, soil fertility, manure and livestock trainings.

Mr. Vaidya mentioned during the interview that in Jumla district, disease pressure is very low and it is a suitable site for agricultural production. He stressed the high potential for apple production and its suitability for trade. One kg apples equals the value of one kg of rice.

## II. Agricultural Development Office

This office is focused on agricultural development, by supporting the farmers with technical knowledge, new crop varieties, multiplied by the NARC, and different training programmes.

Regularly, they hold farmer trainings in their office but they also established sub-centres in some villages with permanent staff, supporting the villagers on the spot.

According to them, the region is quite fertile and during summer season a lot of fit crops are growing well. The high potential for apple production was also stressed, but storing problems were mentioned.

Interestingly, ADO intends to introduce organic farming in Jumla district. The unavailability of mineral fertilizer and pesticides, and the potential to open up markets in India and China for organic products are reasons for this goal.

They asked for support in organic pest management, because about this issue there is still little.

## III. Veterinary station

The aim of the veterinary station is to provide medical support, vaccination and breeding programmes for the livestock. Two to three times a year staff members of the veterinary station visit different villages to treat the animals, vaccinate and de-worm them. Artificial insemination is also provided on-farm.

They also hold trainings for better hay production, which is the only fodder source during the long and harsh winter month.

It is planned to introduce fodder conservation by making silage, as well.

According to the officers, fodder is always short during winter and animals suffer malnutrition. Fodder quality is also very low, due to little knowledge about pasture management and the late cropping of the grasslands (old fodder with high crude fiber and little protein content).

Another goal is to improve the yield of the local cattle breed Kirku, by crossbreeding with the British Jersey breed. Since the milk yield is very low (~ 150-300 kg/year) and people often don't know how to milk, the local cattle is mainly used for manure production. The new hybrid should not exceed a genetical jersey portion of 50 to 62.5 %, due to the low fodder quality of the region. Enterotoxemia (*Clostridium perfringens*), foot-and-mouth disease (FMD) and red water disease (Hemoglobinuria) are main diseases of livestock. External and internal parasites display further problems.



Picture 2: Local cattle breed

#### IV. Forestry Office, Mr. Mohan Poudel

The Forestry Office of Jumla leads forestation programmes by training local persons and providing seeds. Their focus is also on use of “non timber forest products” (NTFP), like herbs and medicinal plants.

In Patmara, a Shangrila project village, they established an herbal farm which is still in the test stage. This project should offer the local people an additional income source and preserve natural resources. The office has already contacted a pharmaceutical company, Davur Nepal, as a potential purchaser. But they still have to wait for the first harvest to check the herb’s quality and yield.

Mr. Poudel mentioned that there are a lot of highly potential herbs and medicinal plants in the Karnali zone, which can be used to increase people’s income. But people are not aware of sustainable use, thus it should be controlled and/or more extensive cultivation of NTFP should be supported.

## V. Botany Office

Like the Forestry Office the Botany Office is also focused on the use of local herbs and medicinal plants. They do some research on cultivation methods and processing of these wild plants. The Building, north of Jumla airport, has a small garden where the most important plants are cultivated. East of the office a kind of extensive botanical garden is found, located on a forested hill.

The Office also published a small booklet about local medicinal plants and their use, but it is written in Nepali language. According to the researchers, most exported NTFP of the Karnali zone is “Jatamansi” (*Nardostachys jatamansi*), a member of the *Valerianaceae*-family.

## VI. Karnali Technical School (KTS)

The KTS is a very important educational institution where students get theoretical and practical skills in health, midwife, construction and agriculture. Shangrila and the KTS have established the out-reach programme (ORP), where students of the second year stay for 4 weeks in the project villages and teach villagers in the mentioned subjects. For the students it is an opportunity to use their acquired knowledge by helping the villagers.

Unfortunately, it was reported that the quality of school is decreasing constantly. The idea was to teach 20 % theory and 80 % practical skill lessons. Nowadays the contrary is true. One reason is the lack of teaching materials and books. Students have to learn, for instance, the use of a thermometer theoretically since the KTS doesn't possess one. Teachers with an academic degree are often not interested in working physically with the students.

### Out-reach-program (ORP)

While I experienced the out-reach programme in Mugu, there were weak points in food and material management. For future programmes students should not suffer hunger and lack of material, especially medicine. To avoid this, additional agreements with the school principals, managing the food and material supply, should be made.

Living under these very poor conditions, students become tired and less motivated after a while. It was also reported, that in some cases the participation of the villagers was very low. One reason is the lack of time due to field work (especially women) but also the sometimes very low motivation of the villagers. The time schedule of the ORP was as follows:



1. week: PRA
2. week: food processing trainings
3. week: “tea manure” (see below) preparation and application
4. week: environmental sanitation trainings



Picture 3: KTS-student teaching villagers of Talituma (Mugu) about food processing

### 5. 3 Observations

One method to get information about the agricultural situation was observation. Due to the existing fields, crops and plant symptoms, conclusions can be drawn about agricultural weak points.

It has to be considered that results were gathered qualitatively during a short time period.

## Agricultural crops

Plants which were found in August and September (2008) are listed below:

- rice (*Oryza sativa*): paddy and upland rice, famous local “marshi” landrace.
- barley (*Hordeum vulgare*; Gerste)
- potato (*Solanum tuberosum*, Kartoffel)
- maize (*Zea mais* ; Mais)
- finger millet (*Eleusine coracana*; Fingerhirse)
- perso millet (*Panicum miliaceum*; Rispenhirse)
- amaranth (*Amaranthus sp.*; Amarnth)
- buckwheat (*Fagopyrum sp.*; Buchweizen)
- beans (*Phaseolus sp.*, Gartenbohne)
- soy bean (*Glycine max*; Sojabohne)
- pea (*Pisum sativum*; Erbse)
- taro (*Colocasia esculenta*; Taro)
- yam (*Dioscorea sp.*; Yamswurzel)
- cabbage (*Brassica oleracea* var. *capitata* f. *alba*; Weißkohl)
- egg plant (*Solanum melongena*; Aubergine)
- pumpkin (*Cucurbita sp.*; Kürbis)
- cucumber (*Cucumis sativus*; Gurke)
- mustard (*Sinapsi sp.*; Senf)
- sunflower (*Helianthus annus*; Sonnenblume)
- tomato (*Solanum lycopersicum*; Tomate)
- apple (*Malus sp.*; Apfel)
- pear (*Pyrus sp.*; Birne)
- peach (*Prunus persica*; Pfirsich)
- lemon (*Citrus limon*; Zitrone)
- pomegranate (*Punica granatum*;  
Granatapfel)
- walnut (*Juglans regia*; Walnuss)
- tobacco (*Nicotiana sp.*; Tabak)

## Weeds

Considering observed fields, weeds don't seem to be a serious problem. Even in the remotest areas weed pest seemed under control. The rice fields in the lowlands, showed only marginal appearance of *Echinochloa crus-galli*, *Blyxa aubertii*, *Rotala indica*.

During the study period, three abundant weeds in gardens and agricultural fields were discovered:

*Galinsoga parviflora*, *Drymaria cordata* and an unknown species probably belonging to *Polygonaceae* and the Genus of *Fagopyrum*.



Picture 4: Widespread unknown weed species probably belonging to the genus of *Fagopyrum*

## Plant nutrition disturbance

Agricultural and also wild plants often showed typical symptoms of nutrient disturbance. Cereals often exhibit yellowing and small habitus, which are typical nitrogen deficiency symptoms.

Fruit trees, sensitive to iron deficiency, often had chlorotic and growth inhibited youngest leaves, indicating iron deficiency.

This observation agrees with the results of the soil analysis. All tested sites possessed a pH-Value from 6-7, implying a reduced availability of micronutrients in the soil.

Picture 6:  
Nitrogen  
deficiency  
symptoms in  
amaranth. In  
comparison to  
the bean,  
independent  
from nitrogen  
supply, the  
yellow leaves  
indicate clearly  
deficiency.



Picture 5: Iron deficiency symptoms in apple-tree



## Plant density / development stage

On many fields and kitchen gardens a conspicuous low plant density was found. Maize, for instance, often had a density of about 3-4 plants / m<sup>2</sup>. Also bean fields displayed a lot of space between the plants.

Further more, the same plant species differed a lot in development stage among the fields. In rice and maize, for example, this observation was very explicit. Two neighbouring fields could show the same species, once with fully developed panicles and once still growing vegetatively. This findings imply that there is only little awareness and knowledge of sowing methods and technologies. It also shows a lack of awareness of the proper sowing date, which was confirmed during the farmer's interviews.



Picture 7: Kitchen garden in Luma.

## Intercropping

Many types of intercropping are practiced in the study area. Often, cereals were planted together with legumes on the same acreage. A mixed cultivation of maize and beans is also very common. Potatoes were found within the same field with maize. However, the cropping method seemed randomly and mainly negative effects



of intercropping could be observed. One crop was often displacing the other crop. Maize plants, for instance, were often more or less covered with beans. So many farmers have no or only little knowledge of well working intercropping methods.



Picture 8: Intercropping of maize and beans. Maize is over grown by the bean plants, obstructing a proper plant development.

### Crop rotation

It was found that people are not aware of crop rotation. Often, the same crop is planted year by year on the same piece of land, causing plant diseases and poor harvests.

### Soil erosion

One very serious problem of Jumla and Mugu district is soil erosion and land slide. Due to extremely high rainfall during the monsoon 2008, heavy land slides showed everywhere. One reason for this problem is the sloppy area, but also the sensitivity for erosion of top soils (see soil analysis).

Especially in Mugu, the land slides endanger also the settlements of people. In one project village, Jhyari, several houses slid down the hill.

Also many fields were washed down the hill so that a lot of farmland is lost forever. This means an additional decline of agricultural production for an area, where food is already not sufficient.



Picture 9: Heavy land slides in Mugu district. The gap has a depth of about 15 meters.

### Pests and plant disease

Very serious and conspicuous plant pests and diseases were not observed.

Maize plants with black dusty cobs were found frequently. This phenomenon derives probably from maize smut (*Ustilago maydis*).

Harvested spikes of barley often possessed dusty dark spores instead of grains, which suggests *Ustilago nuda*.

Post harvest pests seemed to be a serious problem, as well. One farmer showed his stored wheat, which was damaged and polluted by insects.



Picture 10: Probably maize smut



But according to the farmers there are many problems with plant disease and pests during the whole growing period.

They often asked for pesticides, implying their overestimation of chemical remedies.



Picture 11: Post-harvest damages on wheat seeds caused by insects.

### Pasture land

During the warm seasons, farmers keep their livestock on mountainous pasture land. The same areas are often also used for hay production. Viewed pastures showed a high degree of coverage by small bushes and non fodder plants. This indicates no or a wrong pasture management. According to farmers and the veterinary of Jumla, fodder scarcity, especially during winter months, and low fodder quality are serious problems of the study area.

Picture 12:  
Pasture close to  
Daphe pass.  
The vegetation is  
dominated by plants  
which are not feed by  
cattle.



## Apple cultivation

About 20 years ago, apple trees were introduced in Jumla, coming from India. Mainly, two cultivars are used, Red Delicious and Golden Delicious. Trees are reproduced vegetatively, by crafting shoots on roots of a wild tree species, called “Edimeal”.

The medium sized trees (Halbstamm) bear mostly little fruits and also little leaves.

Iron deficiency symptoms are common and leaves often show distinct grub damages and aphid attack.

Most farmers cut these trees during the winter months but without know-how and trainings.

### 5. 4 Results of interviews and PRA-tools

To gather further information about agricultural problems, semi-structured interviews, group-meetings and seasonal calendars were conducted with the villagers.

The results of the interviews and meetings are presented in summary for each village and also in general. The gathered interview results of Mugu are not presented in this chapter, but in the conclusion part. Since, this study and the out-reach-programme took place simultaneously in Mugu villages, PRAs and interviews were done already by the KTS students, it seemed needless to do it twice.

To open and lead the discussion, the following questions were used:

- a) Which resources are scarce in your village? Is there anything you need for a better agricultural production?
- b) Is there enough access to land and how it is distributed?
- c) What do you think about environmental degradation? Is it a problem in your village?
- d) What do you consider your agricultural potentials?
- e) If there were a better infrastructure and easy access to bigger markets, what would you produce?
- f) What would be the choice, if you could decide what we should support?

Answers of the group meetings and people's statements ordered by the villages.  
(comments of the author are set in brackets):



## Luma village:

Participants: 14 men (including 4 Dalits), 4 women

Notice: even if the group meeting was agreed on the day before with 10 key persons, nobody came to the agreed time. Deepak, a teacher of the village, had to fetch all people for the discussion. Thus, people of Luma seem not so interested in this kind of projects! It was also not comprehensible who is a key person and why.



Picture 13: Luma village

- a) - Improved seeds
  - potato, millet and mustard is suffering particularly from disease and insects
  - demand for agricultural tools, trainings and workshops
- b) - mean land tenure: 6 – 10 ropani equates 0.25 – 0.5 ha ( 1 ropani ~ 1/20 ha)
  - 10 to 12 persons depend on this acreage
  - land more or less equally distributed
  - 95 % of the people don't have enough land
- c) - due to deforestation → soil erosion (environmental awareness !!!)
  - sanitary problem, no toilettes in the houses
  - due to increasing population of Luma, increasing environmental degradation
  - people dump rubbish all over

- d) - maize, millet for personal consumption
  - beans, potato, apple as a cash crop
  
- e) - would produce beans, potato, apple
  - would not produce anymore maize and millet

Would you produce rice?

→ (laughing!) they would easily stop rice production, because of high input and low output !!! Marshi rice has no special cultural or spiritual value.
  
- f) - maintenance of the new Shagrila elementary school
  - no rooms for students
  - off-seasonal vegetable production
  - construction of a storehouse → storing is a big problem, for vegetables and apples
  - construction of an irrigation system → due to nonexistent watering system they are unable to produce onions, carrots and cabbage in off-season; 10 to 20 years ago their parents build irrigation canals, but nowadays those are damaged and they are not able to repair them

Why are you unable to repair the irrigation canals?

→ It was build by the parents and only they knew it

  - modern technologies and seeds
  - small cooperatives

Is there enough water for irrigation during the dry season, the month before the cold winter?

→ Yes, from the creek, crossing the village from north.

**Boud Gaoun** (small settlement above and belonging to Luma)

participants: 11 men, 3 women

notice: very nice atmosphere; people have been more interested in the talk than in Luma. A man called Porek answered mostly. He seems really interested in a change

- a) - irrigation problem during dry season
  - there are sources above the houses, want to use pipes

*Why you don't construct an irrigation system?*

→ due to the lack of money, can't buy the pipes which are necessary; in lowland fields there is a damaged irrigation canal; they need resources like metal and cement to repair it

b) *Why are rice fields irrigated and other fields not?*

→ rice field irrigation was supported by NGOs; due to missing upland irrigation in dry season upland fields are mainly fallow; if there would be an irrigation system they would intensify apple plantation (??? makes no sense to irrigate beyond the vegetation period !!!)

*Is the lowland used during dry season?*

→ it is mainly farmed with wheat and barley but also fallow; if irrigation they could produce vegetables and staple food twice a year.

(→ the interviewed persons stressed the need of an irrigation system!)

- they need "good" seeds, technologies, knowledge, trainings and agricultural tools
- they want to know which agricultural crop is suitable for which site
- to produce off-seasonal vegetables, they need materials to build a kind of greenhouse (plastic tunnel)

c) - equally distributed land tenure

Which land is most fertile?

→ lowlands is most fertile; most people of Luma hold little lowland but mostly upland fields

*Why don't they establish a kind of reforestation programme?*

- they want to establish a community forest, but they need the support of a NGO for this project

d) - due to deforestation → soil erosion, which is a big problem

- fertility is decreased by soil erosion (awareness of soil erosion problem!)

e) - they have potential for vegetables, apples, walnuts, potatoes, beans

- they produce maize and millet only for self consumption

*According to them, which is the best adapted, most potential crop?*

→ maize and millet have sufficient yield for self consumption; don't have special knowledge in apple cultivation, for instance how to cut them.

f) - they are satisfied with Shangrila and wish a good cooperation with them

- prefer apple and vegetable production → after 3-5 years new apple trees can have the first yield. During that time, the street connecting Jumla market with Luma should be build.

→ There have been so many foreigners only for collecting data but without any implemented project!

## Patmara village:

Participants: 11 men, 5 women

Notice: The 2 of the 3 invited agricultural key persons did not appear (Kali Bauder and Raul Buddah)→ not interested !? Sucre Taba, another key-person, has organized the meeting. He seems really motivated and reliable.



Picture 14: Patmara village

- a) - a young men mentioned “irrigation” to produce off-seasonal vegetables (due to the high altitude and rough climate, the dry seasons seems to be too cold for vegetable production!)
- main cereals barley and wheat are suffering from several diseases; they need pesticides
- spikes of barley become black without seeds (Gerstenflugbrand?)
- ask for “better” seeds
- use already new potato variety, provided by the Agricultural Development Office. Significantly higher yield, have now enough potatoes for one year
- b) - land is unequally distributed
- don’t count with the square measure “ropani” but with “hal” (1 hal = 182.25 feet<sup>2</sup>)
- people with poor land tenure hold ~ 1 hal



- people with plenty land hold ~ 12 – 15 hal
- estimated mean land tenure per family: ~ 5 hal

*Do you have access to information?*

→ don't have any access to information; KTS students have imparted some knowledge about vegetable cultivation, don't have any textbooks

- c) - environmental degradation (e.d.) is becoming more and more urgent

*What is e.d. in their opinion?*

→ deforestation is the main problem → effects decreasing of rainfalls and climatical change

- d) - potentials are only sheep and potatoes, are satisfied with potato yield

- ask for processing possibilities of potato, don't have knowledge about
- want some new breeding sheep
- mentioned that marketing of sheep, wool and meat, is no problem
- during the season they have an overstock of potatoes, when the price is very low (at Jumla market ~ 10 NPR / kg); maximum price is achieved during winter (~ 20 NPR / kg)

- e) - prefer sheep farming

- sheep farming and potatoes are connected; sheep manure is used for potatoes

→ first priority: sheep!

*Why they keep cattle for manure and not only sheep?*

→ cattle are borrowed from farmers of the lowlands only for some month in the summer season (jesh to asbin); prefer sheep manure but causes plant disease.

*Do you get money for cattle keeping?*

- don't get money but oxen to plough the fields
- cattle suffer from blood in the urine (heamoglobinuria or myoglobinuria)

*How much manure do you apply per area?*

- 1 - 1,5 ton per hal (number seems to high, maybe not familiar with numbers)

*Do you milk the sheep?*

- yes, to drink the milk but yield is very low

- f) - cereal hybrid seeds

- sheep breeding programme
- general trainings and work shops
- know how about manure application
- they yarn the wool by hand, time consuming procedure, asked for new,

improved technology for wool processing

→ most important thing in Patmara is the sheep!

→ the veterinary station of Jumla is not reliable, has only little medicine, which is quite expensive

g) *What do you think about think about out-reach programme?*

→ are satisfied, but the programme is not effective, there are no improvements

→ The Shangrila cooperative programme is not enough

## The seasonal calendar

To get an overview about the annual cycle of agriculture and work a seasonal calendar was drawn with some villagers in Luma and Patmara. It has to be considered that the nepali calendar is used, starting with *baishak* which equates 15<sup>th</sup> of April to 14<sup>th</sup> of Mai. As for lucidity, the annual labour activities are described more detailed bellow. (To enlarge the graphics *click* here: [SC-Luma](#); [SC-Patmara](#))

Seasonal calendar of Luma / labour activities

nepali cal.	1 baaisaakh	2 jeth	3 asaar	4 saau	5 bhaadai	6 asoj	7 kaatik	8 mangsir	9 pus	10 maagh	11 phagun	12 chaait
	April/ Mai	Mai/June	June/July	July/Aug	Aug/Sep	Sep/Oct	Oct/Nov	Nov/Dec	Dec/Jan	Jan/Feb	Feb/March	March/April
Rainfall+ Climate										snow		
Labour activity	collecting yasacumbah, medical mushroom, fuelwood; plowing sowing buckwheat, perso millet	collecting yasacumbah weeding maize + millet first browse of herds rice transpl.	rice weeding general weeding, all crops harvest of barley sowing beans second browse of herds	harvesting wheat weeding beans	harvesting appels, perso millet, buckwheat, finger millet, first potatoes heyng sowing wheat	harvesting maize, potato, beans, finger millet; appel processing bringing down herds	harvesting rice sowing barley upland heyng	collecting stones, timber, fuelwood, litter leave village for day-labouring	house construction relaxation	little work cutting appel-trees crafting appel, walnut, peach apply manure	mainly plowing planting potatoes, appeltrees day-labouring return	sowing rice in nursery sowing maize, millet planting local potato
Labour input												
Food availability/ diversity	potato	sale	to buy	rice			vegetables			potato	sale to	buy rice
Dependency on Jumla												
Pests and crop disease	larva on maize, millet roots	insects on	barley, millet	insects on rice, rice	disease (fungus)							insects on barley and wheat
Demand for money									to buy	ox,	pesticides,	agric. tools
Income	yasacumbah				sell apples	and	medical	plants		sell	appeltrees	
Collecting fuel wood												
	April/ Mai	Mai/June	June/July	July/Aug	Aug/Sep	Sep/Oct	Oct/Nov	Nov/Dec	Dec/Jan	Jan/Feb	Feb/March	March/April

Seasonal calendar of Patmara / labour activities

nepali cal.	1 baaisaakh April/Mai	2 jeth Mai/June	3 asaar June/July	4 saagin July/Aug	5 bhaadau Aug/Sep	6 asoj Sep/Oct	7 kaatik Oct/Nov	8 mangsir Nov/Dec	9 pus Dec/Jan	10 maagh Jan/Feb	11 phagun Feb/March	12 chait March/April
Rainfall+ Climate										snow		
Labour activity	collecting yasacumbha + fuelwood planting potatos weeding barley, wheat work as day labourer sell fuelwood in Jumla	collecting yasacumbha + fuelwood weeding potato, wheat, barley sowing beans make ridges in potato fields	harvesting barley, wheat →labour intense	wheat harvest normally rain-laden month if no rain, threshing of barley	ploughing collecting medical herbs in mountainous area	sowing barley, wheat harvesting potato making hey → labour intense	making hey collecting leaves, pine needles as litter collecting fuelwood sheep from mountain pastures sheep-shearing	collecting fuelwood if possible, daily grazing of sheep	due to cold climate and snow stay at home	due to cold climate and snow stay at home	manure application ploughing potato fields reparation of fences	potato plantation many sheep die (~15%) due to rough winter
Labour input												
Food availability/ diversity	potato	sale	to buy	rice cabbage, wheat		barley, potato				potato (5 kg potato= 1 kg rice)	sale to	buy rice
Dependency on Jumla												
Pests and crop disease		larva on X	barley, wheat X		insect on potato X							insects on barley and wheat X
Demand for money	need to buy	rice in jumla							need	to buy	rice	in jumla
Income	yasacumbha					selling sheep	in jumla					
Collecting fuel wood	X	X					X	X				
	April/Mai	Mai/June	June/July	July/Aug	Aug/Sep	Sep/Oct	Oct/Nov	Nov/Dec	Dec/Jan	Jan/Feb	Feb/March	March/April

## 6. Soil evaluation

Since there is only little knowledge about the soils of Western Nepal available, a qualitative soil evaluation was conducted. This represents a first rough appraisal of Jumla's and Mugu's soil qualities. It was observed that the bedrocks deposit of this region is very heterogeneous and changes within small distances. Soils are affected by this condition, thus the soil qualities also change within small distances, especially the depth. On the slopes mostly Kolluvisole (German classification), whereas in the lowland fluvisols were found. Due to the FAO in Jumla district Leptosols, Cambisols, Fluvisols and Regosols are present.

Mica slate, quartzite, carbonat-containing stone, probably marl, glacial drift and limestone are common bedrocks of Jumla and Mugu.

The soil evaluation was conducted according to the "Praktikumsanleitung zur Beschreibung, Deutung und ökologischen Bewertung von Böden" (Stahr, Herrmann, Jahn). It has to be considered that the evaluation bases on an estimation method, developed for central European soils, thus the results can be inexact. Therefore, rough categories were used to evaluate the properties.

Nevertheless, for a first approach the method seems suitable. Tables with the collected data are attached in the appendix.

Evaluation categories are as follows: very low – low – medium – high – very high

**Table 2:** Soil evaluation of five different sites located in Jumla and Mugu district. The five evaluation categories of the soil properties are based on a German estimation method according to Stahr, Hermann and Jahn. Favourable properties are set in **bold** letters, limiting ones are underlined. The evaluation of the climate is based on villager's statements, displaying also a very subjective and rough appraisal.

	<b>Luma (1)</b> (~2500 masl)	<b>Luma (2)</b> (~2500 masl)	<b>Patmara (3)</b> (2920 masl)	<b>Mandu (4)</b> (~2800 masl)	<b>Jhyari (5)</b> (2580 masl)
<b>texture</b>	sandy silt	loamy sand	clayey silt	sandy silt	sandy silt
<b>pH-Value</b>	6	6,5	5,5	6	6,5
<b>nutrient balance</b>	medium/high	<b>high</b>	<b>high</b>	medium	-
<b>water balance</b>	<b>very high</b>	<u>low</u>	very high	<b>high</b>	-
<b>air balance</b>	medium	medium	medium	medium	-
<b>depth</b>	very high	medium	very high	high	-
<b>erosion potential</b>	<u>high</u>	low	medium	medium	<u>high</u>
<b>stone content</b>	low	<u>high</u>	medium	<u>high</u>	<u>very high</u>
<b>climate</b>	-	-	<u>cold, rough winter</u>	-	-



## Conclusions of the soil evaluation

The local climate also has to be considered for the quality of a site. Especially the annual rainfall amount and distribution display important factors for the vegetation. The monsoon-affected climate of the Karnali zone with its rainy and dry season, shows an extreme unequally rainfall distribution. So water is one limiting factor for plant growth from October until April. Due to the altitude, winter months are also characterized by temperatures below zero and snow fall.

Generally, the evaluated soils show relatively neutral to slightly acidic pH, a high nutrient balance, medium air balance, high depth and tend to a high stone content.

The relatively high pH-values, caused by the young development stage of the soils, cause a good nutrient availability except for micronutrients (Fe, Mn, Cu, Zn), whose availability decreases with increasing pH-value. This fact is confirmed by the found iron deficiency symptoms of apple trees and wild plants.

A good nutrient and the profundity display good preconditions for agricultural use. The high water balance, measured in available field-capacity (nutzbare Feldkapazität), describes the high water amount which can be held by the soil. This also causes a slow warming of the soil.

A high stone content, as present in most soils, impacts the nutrient, water balance, by decreasing the field capacity and the space, where roots can grow and uptake nutrients. The sensitivity for erosion was confirmed by heavy land slides, observed in Luma, Mandu and more dramatically in Jhyari

The rough climate and relatively shorter vegetation period of Patmara displays an important site factor, causing the lower suitability for many agricultural plants.



Picture 15: Soil profil of Luma village. The location on a slope, the high depth and showing different rock types indicate a "migrated" Soil = Kolluvium (German Soil Classification)

## **7. Conclusion, Possible future projects**

### **7. 1 General**

One central development obstacle, as already mentioned, is the missing road, connecting Jumla market with Surhket. The bad access to markets and scarcity of any material are crucial points for development in this area.

On the other hand the food supplies by international NGOs have to be regarded critically. Cheap or even free rice imports influence the prices of local produced goods negatively, resulting in degeneration of the local production and markets.

The present governmental offices in Jumla market represent important institutions for self-help and independent development. Unfortunately, they are also suffering a lack of materials, low governmental support and structural weakness.

The enforcement of these two areas seems very important for a sustainable and independent development but exceed the possibilities of an NGO.

Nevertheless, for future projects the corresponding offices should be consulted to coordinate contents, methods and areas of responsibilities.

Generally, it seems useful to extend the cooperation and information exchange with other NGOs present in Jumla, to avoid useless overlapping.

Already supported by the out-reach programme, the KTS represents a very important educational institution, as well. By educating numerous young people, often returning to their villages, knowledge and practical skills are distributed and multiplied very efficiently. Since the KTS is also suffering a lack of teaching materials, especially books, it seems very useful to extent the support by providing technical literature, tools and instruments. The support should be managed by a member of Govinda Germany / Shangrila Swiss and foreign technical literature, hardly available in Nepal, should be preferred.

The contents of the ORP should be adjusted to the individual needs of the villages, since the same fixed programme is conducted in every village. The inquired data of the students PRAs should build a basis for a more specific and village-adjusted programme. Furthermore, thinking over the ORP duration, time-schedule, contents and how to motivate the villagers is necessary.

Based on the observation results, all mentioned findings can be used as topics for general agricultural trainings. Manure management, sowing technologies (time), intercropping, crop rotation, pasture management, pests and plant disease prevention, food storing (cereals), cereal drying and soil conservation are subjects, where changes are necessary and possible and improvements can be reached with

low input. The necessity of soil conservation programmes is emphasised particularly. Especially in Mugu district, heavy land slides endanger the food security seriously. The training subjects should be chosen by the villagers, since motivation and marginal participation are an important problem for the development progress. However, people might not consider soil erosion an important task, but environmental conservation and sustainability principles should be thought, all the more . Due to the lack of materials (mineral fertilizer, pesticides) and its sustainable approach, the introduction of organic farming should also be a regional goal. The higher market value of the products on Indian and Chinese markets is an additional argument for that.

The high potential of (organic) apple plantation can be seen as a common regional development project, as well. But marketing opportunities are a fundamental precondition for this goal and should be clarified as a first step. Maybe a regional apple marketing cooperation can reach access to markets by organizing transportation (aeroplanes) to Nepalgunji. Furthermore, suitable apple varieties should be introduced and tested, since only two varieties (Golden and Red Delicious) are widespread, presently.

The collection and sale of wild medicinal plants is already an important additional income source. For any project considering this topic, the corresponding offices should be consulted, since herbal farming projects are already running and overuse and endangerment of these plants must be avoided.

Finally, the people's motivation and participation are a fundamental precondition for the success of any project. Since in some cases villagers showed only little interest in participation and a change in their behaviour, it should be clarified if people really want any project, first of all. The "will for change" is one crucial point for development.

## **7. 2 Projects villages**

### **Luma**

Since people of Luma emphasised the potential of apple cultivation in their village and the found apple quality seemed good, Shangrila could provide apple cultivation training in that village. These training could contain basic and advanced knowledge like site selection, crafting, cutting, pest prevention and about the harvest.

A further project topic could be the introduction of a simple irrigation system on the lowland fields close to the river. It should be tested in a small experimental set up if irrigation makes sense in that rough climate. Low temperatures in the early dry season and snowfall in December could be the main limitations for off-seasonal

vegetable production.

## Patmara

Due to the high altitude and the cold climate, Patmara's agriculture is dominated by sheep keeping. The villagers stressed particularly their dependence on this domestic animal and asked for sheep-trainings and improved wool processing methods. Thus, useful agricultural projects in Patmara should focus on sheep keeping and wool processing.

## Mugu villages

For all project villages of Mugu general agricultural trainings, as mentioned before, seem useful. However, more fundamental for these villages, especially Mandu and Jhyari, seem health and hygienic trainings. People of both villages seem particularly dirty and dull. Their omnipresent excretion and low hygienic awareness cause a lot of human diseases. This topic has first priority.

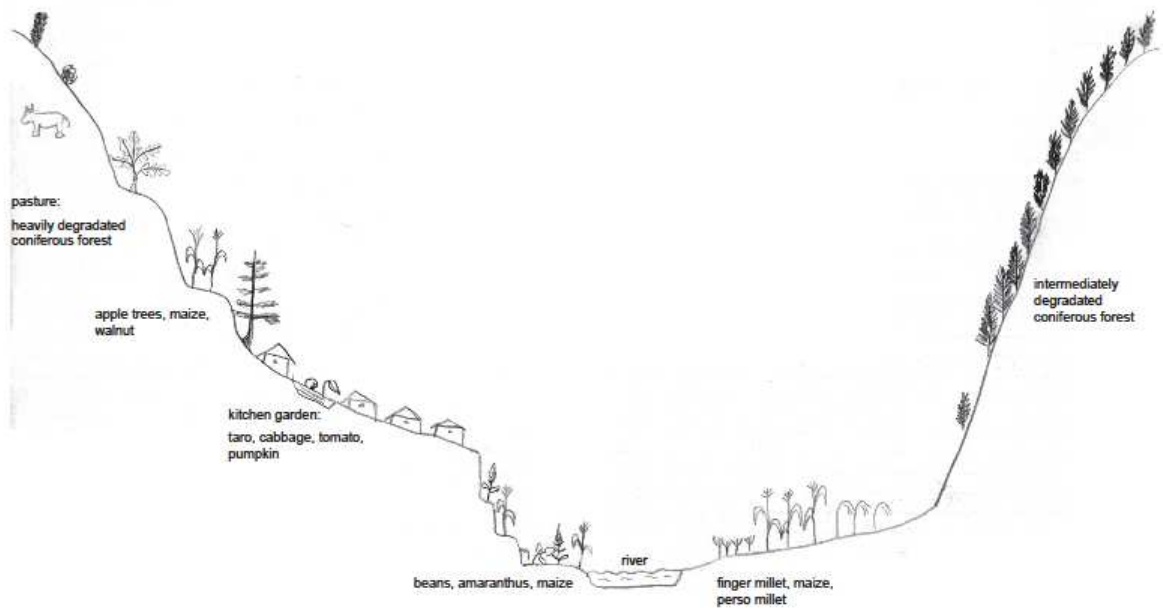
As already mentioned, land slide is a serious problem in Mugu and should be counteracted by soil conservation programmes. Especially Jhyari's people and houses are seriously endangered by land slides. For this village resettlement has to be considered!



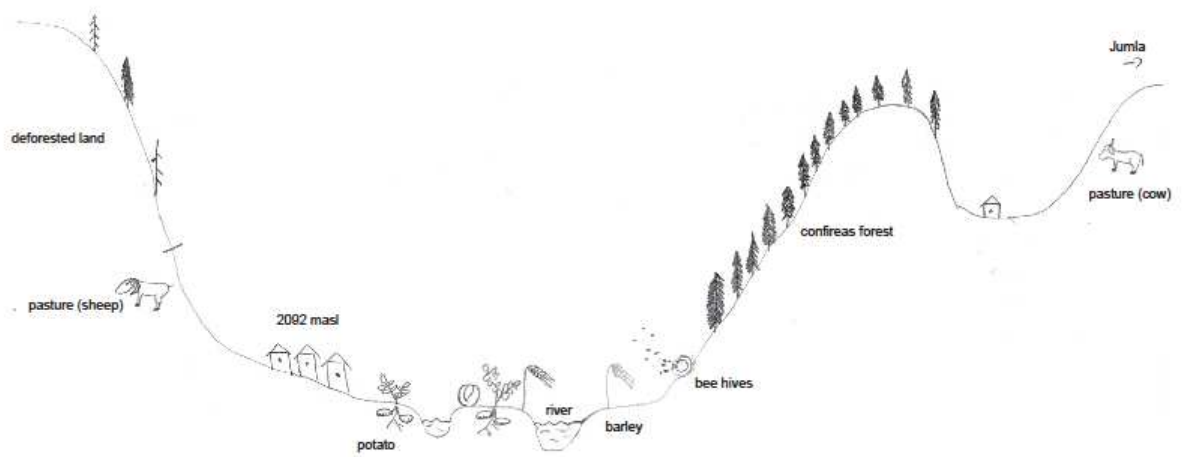
Picture 16:  
Heavy land  
slides in Jhyari  
endanger the  
buildings. Few  
houses are  
already slide  
down the hill.



Transection map of Luma



Transection map of Patmara



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## 9. Glossary

### Cereals / pseudo cereals:

chino

uwa

dal

phapar

latte

kodo

perso millet (Rispenhirse)

nacked barley (Nacktgerste)

rice (Reis)

buckwheat (Buchweizen)

amaranthus, fox tail (Amaranth)

finger millet (Fingerhirse)

### Other field crops:

bhattamas

kerau

musuro

alu

tori

soy bean (Sojabohne)

pea (Erbse)

lentile (Linse)

potato (Kartoffel)

mustard (Senf)

### Vegetables:

banda kobe

venta

lauka

raya

bhaje

cabbage (Kohl)

bringel, egg plant (Aubergine)

spinaci gourd

leaf vegetable (Brassica?)

Cannabis, hemp

### Fruits:

arau

okher

aaruhbakhara

naspati

kaphal

plum (Pflaume)

walnut (Walnuss)

pear (Birne)

peach (Pfirsich)

bayberry

### Livestock:

chakhura

pigeon

khaddar

wild chicken (Wildhuhn)

duck (Ente)

local cattel (lokales Rind)

**Tools:**

halu goru

wooden plough driven by ox  
(Holzpflug)

bauso

kind of Egge, to levelling the field

kuto

kleine harrow for kitchen garden  
(Egge)

hasiya

sichel

faruwu

spade (Spaten)

joo / mudo

Dreschschlegel

**Units:**

ropani

1 ropani = 1/20 ha

hal

1 hal = 182.25 squarefeet

muri

kattha / dun

pannier ~ 40 kg (Tragkorb)

doko

bamboo pannier ~ 40 kg  
(Tragkorb)

traila

rice bag ~ 30 kg (Reissack)

**Others:**

mato

soil (Boden)

khet

lowland, irrigated land (Niederung)

pakho bari

upland (close to house)  
(Steillagen)

kalij

fallow (Brache)

khurat

foot and mouth disease

(Maul-, und Klauenseuche)