AGA KHAN RURAL SUPPORT PROGRAMME
BALTISTAN

NLH
AGRICULTURAL
UNIVERSITY OF NORWAY

HIGH ALTITUDE INTEGRATED NATURAL RESOURCE MANAGEMENT

REPORT NO. 8

ANNUAL PROGRESS REPORT 1999

POUL WISBORG
MOHAMMAD AKBAR RAZA (EDS.)

AKRSP - NLH, DECEMBER 1999

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HIGH ALTITUDE INTEGRATED NATURAL RESOURCE MANAGEMENT:
This is Report No 8 (*Annual Progress Report 1999*) of a report series presenting the activities and preliminary findings of joint research under an institutional cooperation programme between the Aga Khan Rural Support Programme, Pakistan, and the Agricultural University of Norway.

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TEAM LEADERS (1999)

NLH: Poul Wisborg, Senior Executive Officer
AKRSP: Mohammad Akbar Raza, Manager Agriculture

PROJECT REPORTS

Report No. 1: Summary report 1998
Report No. 2: Institutions and organisations in pasture and forestry management 1998
Report No. 3: Pasture, livestock and biodiversity 1998
Report No. 4: Natural forest inventory 1998
Report No. 5: Gender, resource management and livelihood security 1998
Report No. 6: Information and documentation 1998
Report No. 7: Socio-economic survey of Basho (project site) 1998
Report No. 8: Annual Progress Report 1999

More copies of the reports may be obtained from AKRSP, Regional Programme Office, Skardu or Noragric's Library.

Overview of project components and counterpart team leaders

More team members are listed in Appendix 1.

Project	NLH	AKRSP
Institutions and organisations in pasture and forestry management (property rights and other formal and informal institutions interpreted as the rules for behaviour; organisations/actors within the institutional framework)	Håvard Steinsholt	M. Akbar Raza
Pasture, livestock and biodiversity (the dynamics of high pasture management, fodder demand and fodder production, quality assessment for land use planning and conservation of soil and vegetation	Øystein Holand/ Per Wegge	Mohammad Afzal
Farm forestry and natural forest assessment (forest and tree resources assessment, regeneration evaluation, and analysis of the supply and demand of forest products and linkages between farm-forestry practices and natural forest)	Knut Velle/Heidi Asbjørnsen,	Jawad Ali
Farm resources (linkages with *"below the channel"* resources, which include land, crops and trees, and how different groups of households fuse private and common pool resources in livelihood strategies)	Åge Nyborg	M. Akbar Raza
Gender, resource management and livelihood security (dynamics of changes in women's and men's use, access to and control over resources, and the effects of changes on household food security)	Ingrid Nyborg	Kulsoom Farman
Information and documentation (creating a common information resource base relevant to all project sub-themes, facilitating exchange of information between project counterparts in Baltistan and Norway and supporting AKRSP Baltistan's efforts in networking for information access)	Liv Ellingsen	M. Yousuf
Coordination	Poul Wisborg	Mohammad Akbar Raza

The programme is implemented in cooperation with *the Basho Development Organisation, Northern Areas Forest, Parks and Wildlife Department*, the *World Conservation Union (IUCN)* and other local institutions.

Preface

The Aga Khan Rural Support Programme (AKRSP) and the Agricultural University of Norway (NLH) have entered a cooperation programme on alpine resource management. The programme was planned during mutual visits in 1997 and implementation started in March 1998. The programme is funded by the Norwegian Agency for Development Cooperation (NORAD) as an integrated part of Norwegian support to AKRSP's natural resource management programme in Baltistan.

During 1998 the partners initiated an integrated study of alpine resource management systems (pasture and natural forest) in the Basho watershed of Skardu District. From 1999, the partners have entered a three year period of co-operation, based on NORAD's approval of AKRSP's application for a total of NOK 4.0 million for the continuation of the cooperation project during the period 1999 - 2001. Total NORAD support to the NRM programme has a frame of NOK 13.2 million.

The Annual Progress Report 1999 briefly outlines the project objectives, focus and components and the main activities and results during 1999. It assesses overall progress and makes general recommendations about the continuation of the programme. For more detail, reference is made to previous reports 2 to 7, to the Project Document and Action Plan 2000 (forthcoming).

Acknowledgements

In both the initiation phase and the continuation in 1999, participants have enjoyed the opportunity to carry out field research in the Basho watershed of Skardu District. We want to thank again the people of Basho, the village organisations and the Basho Development Organisation (BDO) for a warm reception, permission to expand the range of activities and for exceptional hospitality and support. BDO leadership, President Ghulam Rasool and General Secretary Mohammad Younus Shehzad, not only approved and facilitated the cooperation programme, but also participated actively in carrying out several activities and discussing research findings. Men and women of the eight villages of the watershed have again contributed of their valuable time and knowledge. The active and committed participation by Nazimabad villagers in a goat productivity experiment is just one example. In 1999, we experienced the advantage of coming back, and of being able to both meet more villagers (for instance visiting Bathang in the lower part of the Basho watershed) and of enjoying deepened relationships with some groups and villagers (particularly in Sultanabad). The maps, reports, photos and other documentation that we have been able to provide to local people and the schools of Basho watershed are, indeed, only small tokens of our appreciation. While it is impossible to name all, some individuals from Basho who made a special contribution have been mentioned in the list on the following page.

We thank the District Commissioner, Skardu, Haji Sanaullah and other government officials, for their interest in the collaborative programme and for offering useful recommendations and advice, and in some cases active participation in the programme. The Divisional Forest Officer, Skardu, Mr Sharif, again generously offered the Forest Department Guest House in Basho for use by AKRSP and visiting researchers.

We thank NORAD and the Royal Norwegian Embassy, Islamabad, for the continued support and for the consistent good-will towards the cooperating institutions, as well as active interest in the challenges and development potential of Baltistan and the Northern Areas at large.

AKRSP made excellent arrangements for field research. All Norwegian participants sincerely appreciate the many efforts without which they would not have been able to carry out our work in Baltistan. Field Management Unit Khaplu deserves special thanks for facilitating an intensive learning session and field visit on institutional issues. AKRSP Gilgit arranged the "Workshop on NRM Issues" in Gilgit 22 - 23 May 1999, and this proved an excellent opportunity to share some experiences and strengthen the contact with a range of institutions committed to some of the same issues and causes as those of the AKRSP- NLH linkage programme.

Support by local people, government institutions and the donor agency will remain a condition for the project to achieve its goals. The partners appreciate with humility the good relations and many contributions they have enjoyed so far. We hope that the linkage programme may continue and grow to the benefit of local people, the co-operating institutions and relevant government authorities.

Ås/Skardu, December 1999

List of some individuals from the Basho watershed who made special contributions during 1999

Participants in BDO Meeting 25.05.:

Ghulam Rasool, Nazimabad (VO Manager, BDO President)

M. Younus, Guntho (VO President, BDO General Secretary)

Haji Dulat Ali, Sultanabad, Elder

S. Hassan, Sultanabad, School Teacher

Salman Ali, Sultanabad, WO Manager;

Haji Shifa, Sultanabad, VO Manager

Mirza, Sultanabad, Elder

Haji Muhammad Haider, Nazimabad, President, Conflict Resolution Committee

Ahmed Shaheen, Nazimabad, VO President

Husseins, Nazimabad, Member

Akhund M. Khan, Guntho, VO Manager

Ali Hussein, Meito, Member

Fida Muhammad, Meito, VO Manager

Syed Talib Shah, Khar, VO Manager

Ghulam Hassan, Bathang, President Conservation Committee

Akhund Ebraheem, Nazimabad

Ghulam Abrahass, Doros, Member

Qambar Ali, Doros, Member

Field assistants/field guides

Ghulam Abas

Muhammad Diin

Muhammad Ashraf

Secondar (driver)

Other resource persons:

Mr Muhammad Musa, Manager VO, Bathang

Mr Fida Muhammad, Manager VO, Meito

Shamsheer (herder)

Abe Diin (herder)

Sahara, Zebu, Saida & Khanum from Nazimabad, who sorted all the plants.

Yonus Shafrad (key informant and translater)

Goat owners and VO in Nazimabad

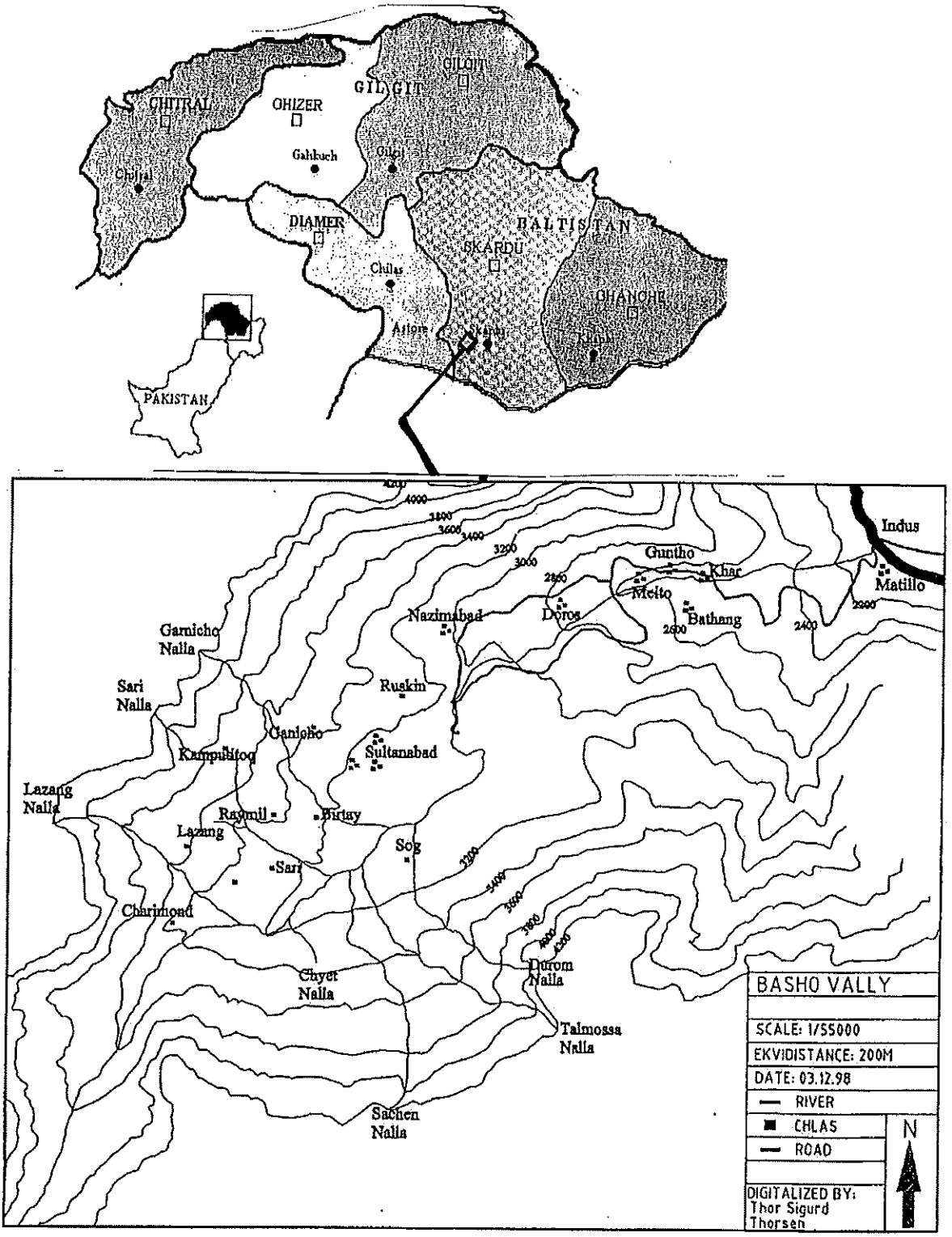
People carrying cages for studies on biomass production and building enclosures for the trampling experiment.

People taking part in village interviews about summer movement patterns.

List of acronyms and abbreviations

AKRSP	Aga Khan Rural Support Programme
BDO	Basho Development Organisation
DFO	Divisional Forest Officer
IUCN	International Union for the Conservation of Nature
JMM	Joint Monitoring Mission
NRM	Natural Resource Management
NLH	Agricultural University of Norway
NORAD	Norwegian Agency for Development Cooperation
Noragric	Centre for International Environment and Development Studies, NLH

Map of the Basho Watershed and its location within Pakistan



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1. INTRODUCTION

1.1 AKRSP – NLH Co-operation

The context of this report is the agreement between AKRSP and NLH to cooperate on a combined programme of competence building and applied research on High Altitude Integrated Natural Resource Management (Project document: NLH - AKRSP, 1997). It is stated here that:

> *The aim of the institutional cooperation programme is to gain further insights into pasture and forest resources and their role in farmers' livelihood systems. Participatory, applied research shall enhance the capacity of AKRSP to work with village organisations and partner institutions for sustainable management of pasture and forestry resources, through providing knowledge which may be used in developing management and conservation strategies, initially at project sites.*

The specific objectives relating to AKRSP are:

- To expand the knowledge of the resource systems of Baltistan through a joint research project in order to enhance the capabilities of project staff to respond to the challenges of integrated resource management in high-altitude areas
- To improve AKRSP documentation and extension systems with respect to forestry and pasture
- To improve AKRSP's links with national and international research institutions

The specific objectives relating to NLH are:

- To strengthen its knowledge-base for development-oriented research in the region and within fields where NLH is already working
- To gain the opportunity for carrying out applied, participatory research together with an implementing NGO and farmer-based organisations
- To provide an opportunity for staff, students and ex-students to gain field level working experience in Baltistan, Pakistan

The main **activities** in the programme will be:

- planning and conducting joint, participatory field research/documentation
- training and capacity building for AKRSP staff, primarily through joint research/documentation
- disseminating and sharing knowledge gained through workshops, training sessions, networking and publications
- exchanging information, references and literature through a library link for improved networking and information management
- offering technical advice for field-level application of the knowledge generated through research

The project is based on AKRSP strategies to increase its work on pasture and forest issues. The AKRSP Programme Proposal 1997 - 2001 states that,

> *"the goal of the Natural Resource Management (NRM) programme is to improve the living standards of people in northern Pakistan through building local capacity for more productive, integrated and sustainable management of their natural resources."*

The proposal indicates an increased strategic emphasis on "above the channel" resources:

> *"..in the next phase, AKRSP intends to make environmental concerns a greater part of its planning and programming.....NRM efforts will have environmental interests as one of its central aspects ..... alpine pastures and*

natural forests will be included in the discussion of village and watershed plans...".

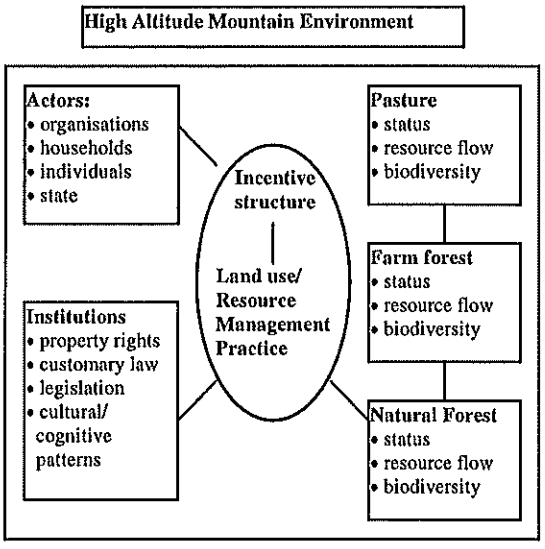
The 1997-2001 proposal also addresses the institutional challenges involved when above the channel resources and wider environmental concerns are given a more prominent status:

"Subject to future agreements, AKRSP will, in principle, support joint Government - VO/WO initiatives in forest conservation and pasture development"...."links with IUCN biodiversity projects have already been established.."....."pasture development will be integrated with watershed level planning....appropriate user-based institutional arrangements for improved pasture management will be introduced...."

1.2 Focus and components of the study

Based on joint planning workshops in Norway and Baltistan, the partners formulated a project focusing on high altitude natural resources. In spite of the practical formulation of sub-themes, the purpose remains to provide an integrated understanding of resource management, reflecting the integrated nature of local ecosystems and livelihood strategies. Integrated analysis is supported by a broad model of natural resource management (Figure 1).

Figure 1: Conceptual model



2. STUDY AREA: BASHO VALLEY

2.1 Selection of study area

As a part of the NRM programme of AKRSP-Baltistan, the cooperation project focuses on Baltistan, the eastern-most region of the Northern Areas. During the NLH-AKRSP Field Planning Workshop in Baltistan in September 1997, the Basho watershed was suggested by AKRSP, and subsequently chosen, as the site for a joint case study. Some factors were:

- The presence and importance of alpine resources, including natural forest assumed to be among the largest patches left in Baltistan
- Local people's active interest in the alpine commons, partly expressed through the recent formation of a cluster organisation (the BDO)
- Accessibility (less than two hours driving distance from Skardu)

Basho was selected, therefore, as an interesting and illustrative case for both AKRSP and NLH, given the interest in the high alpine zone. Alpine natural resource management in Basho is probably similar to that of many other watersheds in Northern Areas or Baltistan, but in a strict scientific sense it was not selected to be representative of a certain larger area.

2.2 Brief description[1]

The Basho watershed is located about 45 km west of Skardu Town in the District of Skardu, Baltistan. The total area of the watershed is about 120 km^2. It ascends from the southern side of river Indus at an altitude of approx. 2,150 m elevation to the Banak La mountain at 5,520 m elevation. The uppermost village of Sultanabad is situated at approx. 3,200 m

[1] See reports 2, 3 or 4, 1998, for details.

elevation. It is located within the co-ordinates 75°10' and 75°25' (East) and 35°20' and 35°30' (North).

Situated in the western-most arm of the Himalayan range, Basho is found within a semi-arid and rugged mountain landscape ("mountain desert"). It falls within the "rain shadow" of the Himalayas, and average rainfall in the valley bottom is estimated to be between 100 and 200 mm, but rising with elevation to create a moist environment at the extensive, high-altitude rangelands. Because of the altitude, the area has a marked seasonal climate comparable to that of the temperate zone. The mean maximum temperature during summer revolves between +30 - 35° C, while the mercury is reported to drop to -15° C in winter.

The area falls under three major vegetation types (Schweinfurth, 1957). The lower north-eastern part from the river Indus to about 2,500 m elevation is described as ***Sub-tropical semi-desert***. The area above the Sub-tropical semi-desert is classified as ***Steppe of Artemisia***, dominated by scrubs such as *Artemisia maritima*, *Eurotia ceratoides* and *Kochia*. The average rainfall may approach 400 - 500 mm, depending on location, and most of the precipitation is received as snow during winter. The vegetation described as ***Moist alpine scrub and meadows*** borders the ***Steppe of artemisia*** at about 3,600 m. Natural blue pine forest covers the north-western facing moraine slopes above Sultanabad. The forested moraine slopes are led by deep gulches and glacifluvial gravel fans sparsely vegetated by pine trees, willow (*Salix sp.*) and shrubs. Grassy slopes and juniper (*Juniper macropoda*) cover areas where the forest has been cut down. Above the pine forest, patches of birch (*Betula utilis*) delineate the upper forest line at about 3,800 m.

Wildlife known to be found in Basho is Asiatic ibex (*Capra ibex sibirica*), snow leopard (*Panthera uncia*), wolf (*Canis lupus*), red fox (*Vulpus vulpus*), marmot (*Marmota caudata*) and mouse hare (*Ochotona sp.*). Musk deer (*Mochus mochiferus*) is known to be found in the area, but has been highly priced and hunted for its musk. Common birds include chukor partridge (*Alectoris chukar*), jungle crow (*Corvus machrohynchos*) and Himalayan snowcock or ram chukor (*Tetraogallus himalayensis*).

People in Basho live in eight different villages distributed from top to bottom of the zone of permanent habitation along the Khar Nullah: Sultanabad, Nazimabad, Doros, Meito, Guntho, Khar, Bathang and Matillo. Agriculture and livestock production are the major sources of livelihood; the pastoralist system involves a seasonal transhumance between villages and temporary settlement in the high alpine zone. Off-farm employment plays an increasing role. Visitors find the natural scenery in Basho attractive; local people are at an early stage of developing trekking and other forms of tourism, and as of 1999 visitors have been coming to Basho from the Shangri-La hotel at Kachura.

The majority of people are *Balti* speakers, while a minority are *Shina* speakers (immigrants from the Astore Valley).

The total number of households in Basho is estimated at 297 and approximate number of inhabitants at 2,400, based on an average

household size of eight (Socio-economic survey by Aurang Zeb Zia, AKRSP, 1998).

AKRSP has worked in Basho since 1987. Today, seven of the villages have a Village Organisation (VO) and four or five have a Women's Organisation (WO). A cluster organisation, Basho Development Organisation (BDO) was established in January 1997, but as with the VOs, it grew out of a long-standing tradition of cooperating within the watershed. Villagers refer to a tradition of shared ownership and use of alpine resources.

3. MAIN ACTIVITIES AND FINDINGS 1999

In 1999, the joint work on applied research and documentation continued. Joint applied research has been chosen as the main mode of competence building. Reporting should therefore not be seen as a matter of presenting "findings" in isolation - but as an indicator also of broader co-operative efforts and processes.

As of 1999, it was possible to initiate some activities which require more time, both in terms of getting the empirical data, in terms of joining perspectives and findings in integrated analysis and of developing competence and skills of all participants. The present reporting should be seen as part of an on-going process towards all of these objectives.

3.1 Institutions and organisations in pasture and forestry management

Håvard Steinsholt, Mohammad Akbar Raza, Poul Wisborg, Hans Sevatdal

3.1.1 Objectives

In 1998, Prof. Hans Sevatdal, Håvard Steinsholt, Poul Wisborg and Mohammad Akbar Raza carried out fieldwork in Basho. The main findings and interpretations were presented in Report No. 2, 1998. In 1999, the work aimed at further exploring the issues of:

- The institutional dynamics of alpine pasture management
- Village forest use and forest rights
- Village land tenure (in-fields)
- Organisational development and the role of the Basho Development Organisation (BDO)
- A comparison with another area of Baltistan (Khaplu)

This section gives a brief overview of findings and main ideas, which are to be further developed through discussion and analysis in reports that will be produced in 2000 and summed up in the project's final report.

3.1.2 Approach

This work is based on field research using primarily interviews and other qualitative methods. Visits to one other watershed facilitated information sharing and give basis for a crude comparison of the main issues.

3.1.3 Activities

Together with other team members, Mohammad Akbar Raza, Håvard Steinsholt and Poul Wisborg carried out field work in Basho 24 May – 4 June. The fieldwork involved meetings with BDO members; focused group discussions with villagers and participatory mapping exercises; field trips to lower and upper broqs and major forested areas; a brief case study of land tenure in the Bathang village; and a two day field visit

to Khaplu and Hunjor broq. The team worked closely with the project members working with other aspects of forests (Knut Velle, Jawad Ali, W. Shabir) and pastures (Veronika Seim, Øystein Holand and M. Afzal). Workshops with AKRSP staff, with presentations of preliminary findings and discussions, were held in Khaplu (07.06.99) and in Skardu (10.06.99).

During August to November, the project has been followed up through participation in NLH team discussions, reporting and planning, and correspondence about findings.

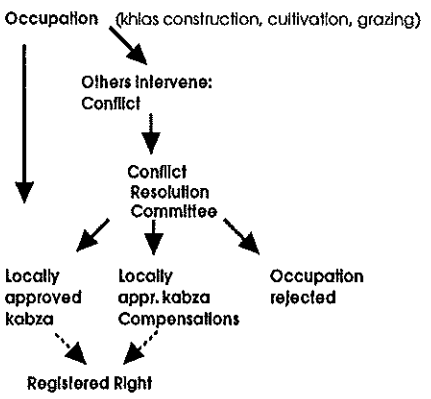
3.1.4 Main findings

Dynamics of pasture management and land tenure

Work in 1998 gave an overview of alpine pastures and the main patterns of pasture use (Reports no. 2 and 3, 1998). This year the teams focused more on selected *broqs*[2] (primarily the Ruskin lower and upper broqs) and the dynamics of change. A sketch of the lower Ruskin broq prepared by villagers (transferred from paper) is in Appendix 3, and examples and a preliminary classification of *khlas'es* in Appendix 4.

The *khalisa sarkar* (state land) is perceived to have variable "degrees of rights" attached to it (beyond the dichotomy described last year between "forest" with a strong presence of the state and "pastures" with none). Basho pasture (and forest) utilisation appears not to be ruled by age-old rights and practice, but is highly dynamic and competitive. People stress that networks based on friendship, kinship, co-ownership or exchange of land rights, goods, labour and animals contribute a lot to preventing conflict. Still, the Conflict Resolution Committee (Islahi) of the BDO is a very important organisation within the local land use system. The on-going process of *kabza*[3] through building of *khlas'es* is partly regulated by the Conflict Resolution Committee (ref. Figure 2 below). In case of a conflict about a new *khlas* (e.g. Daiminimond, 1998), the committee may a) approve the *kabza*; b) approve the *kabza*, but with a compensation to the party who has incurred a loss, or c) reject the *kabza*, where it is not rightful according to Islamic law (as when it is built on land to which someone else holds title), or according to local custom.

Figure 2: *Kabza*: occupation, conflict resolution and approval



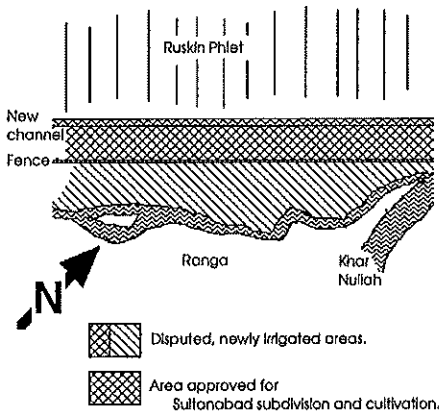
During the past year, Sultanabad villagers were reported to have enclosed a part of the Ranga grazing area for private cultivation of alfalfa and trees (below *Ruskin Phlet*, where new irrigation water is available, ref. Figure 3 below). This led to tension with other right holders. The Conflict Committee has tried to limit the extent of this

[2] Alpine grazing area with a *khlas* (summer farm shed)

[3] *Kabza* is a process of taking possession of land through use (cultivation). Haji Haider, Chairman of the Conflict Resolution Committee, explained that *kabza* has

kabza, and is still considering the case. In another case, Sultanabad villagers sold parts of land brought under *kabza* from *Ranga*. The Conflict Resolution Committee rejected this action and the land holders were forced to go before the Magistrate and have the sales cancelled.

Figure 3: Sketch of disputed newly irrigated area in former common land (*Ranga*)



Village forest rights and forest use

Together with villagers and the AKRSP-NLH forest team, the team mapped about twenty-five different forest areas identified by villagers in Basho. An overview of the uses of different areas by village is given in Appendix 5.

The issue of inter-village forest rights is complex, conflict-ridden and confusing, due to:

a) The absence of a clear community tradition of clarifying rights, due, perhaps, to the situation of resource abundance which prevailed until the forests were "opened" some thirty years back
b) Different uses of forest are strongly determined by location, topography and access, and the distinction between "use" and "right" is blurred, although often repeated in villagers' presentation of the issue[4]. Grazing is an important aspect of forest use, and fire wood consumption is partly linked to owning and staying at *khlas'es*.
c) The rights of government are actively contested by villagers
d) BDO rules, including felling regulations, are contested by villagers.

While forest legislation defines the use rights of local people to forest, there appears to be no written rules which define and delimit these rights in geographical and social terms. Some villagers refer to "the Government revenue paper" (apparently the 1918 agreement about village grazing rights, ref. Report No. 2, 1998) when they describe rights to forest. According to a study by AKRSP, this agreement does include forest use rights (Jawad, 1999).

The Conflict Resolution Committee referred to a traditional division of forest rights between the upper three (or four) villages to the forests from Foroqcho and southwards, on the one hand, and the lower villages to Goriaq and northwards, on the other. They said that this had now changed, so that today the forest rights are shared between all the upper seven villages[5]. As indicated by

a legal basis in *Shariah*, according to which all land is *owned by Allah*, but may *be taken into use by humans*.

[4] For example, in Bathang key informants said that in principle all the villages *have rights* to the Bolom and Goriaq forests, but that access makes it difficult for most of them to exercise them. Similarly, Bathang people do *have rights* to the upper east-side forests (*Foroqcho* to *Shanes*), but they rarely use it for firewood, because of the long walk to get there.

[5] As per the previous footnote, this view is often expressed by villagers, including BDO members, but it also appeared to be rather hotly contested by some, when

the overview of actual forest use in Appendix 5, the forest areas may be divided in the following groups:

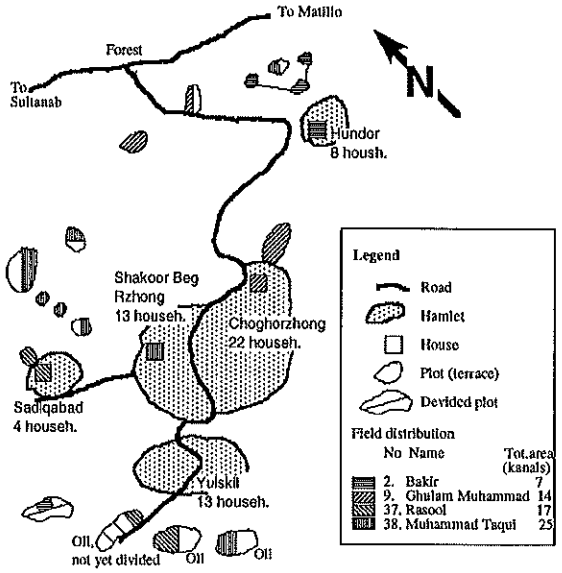
i. Forests almost exclusively used by Matillo and Bathang (Metsik, Fara, Kiltar, Nilo, Tamchan, Bolom)
ii. Forest used by the Middle Three (Bathang, Khar, Guncho): Goriaq, Emeil
iii. Forests used by the Upper Seven (all except Matillo): East side upper forest from Foroqcho to Shanes + Charimond)
iv. Forests used by the Upper Four (Meito, Doros, Nazimabad, Sultanabad): Sari, Astani Shalma, Bitay and Ganicho[6]

However, these generalisations are contested by different groups (as one discussion in a larger forum showed). Further investigation of the issue is necessary, partly as an input to socially sensitive forest management planning (recommended in 3.3.).

Village resources and land tenure: Bathang

The team spent two days in Bathang (the second lower-most village of Basho), discussing both village resources and above the channel issues. Bathang does not have drinking water from September to May, which makes fifteen of sixty households move to other villages during winter[7].

Figure 4: Sketch of Bathang Village: distribution of plots owned by selected households



Prepared by Mr Muhammad Musa, Manager VO, Bathang

Mr. Musa, who provided the information for the sketch above, also gave (orally) a list of the sixty households of Bathang, and each household's total land holding and number of parcels. In Bathang about 600 kanals of land are distributed on 197 plots. The average household owns 10 kanals (0.5 ha) of land, and the average number of plots per household is 3.3. One third of the households own holdings in more than one village. Land inheritance normally involves subdivision of all plots. The informant stressed that even the owners of relatively large lands (25 – 40 kanals) depend on borrowing, purchases and other sources to meet their food requirements. He claimed that in the whole of the Basho watershed there would only be four to five households who are able to produce enough food for the household, and that the normal pattern would be that self-grown supplies lasted four to six months only. At the same time, the sources of cash are limited. He

discussed on a meeting with BDO members/villagers on 4 June, 1999.

[6] On *Ganicho* (Raja-land), and apparently some other cases, the rights to trees are held by a limited number of households (according to one informant).

[7] It is predominantly women who collect drinking water (in Guncho), a task which takes about two hours a day. A regular drinking water supply is the major development priority for women (pers. comm. Veronika Seim, after meeting with Bathang WO).

reported twenty percent of the grown males work outside the village in government or private service.

The cash and food crunch that people are facing make it difficult for them to choose never to draw upon the timber capital located in the mountainsides above them. Logging is reported to be an activity mainly performed by unemployed, courageous young men - much less logging was going on during times of employment for channel construction. Apparently the major part of farm-produced wood is sold in the market (legal option), while domestic needs are met from the natural forest (also legal). This is an example that "more production below" does not automatically lead to "less pressure above": the linkage is mediated by socio-economic and institutional factors.

People are expecting an expansion of their irrigated area (AKRSP supported channel project). In support of information from the 1998 survey, they say that they will use the increased fodder production to expand their number of animals; while the per capita agricultural land holding is going down, the economy may be becoming increasingly livestock based. As, perhaps, a trend in the other direction, eight households in Bathang (of sixty) do not own animals at all – predominantly households where the male head is employed outside the village.

Change, organisational development and the BDO

The Basho communities are challenged by changes from outside and inside the watershed, all of which affect the utilisation of natural resources. Some of the more important factors of change are:

- Infrastructure has broken the watershed's isolation
- General development and increased mobility cause more of the watershed's economy to be based on trade. As one Bathang informant said: *"The life style has changed. Now we need goods that cost money."*
- Population growth causes fragmentation of already small plots of cultivated land.
- New household structures are developing and many men work and live outside the watershed for large periods of their life.
- Education is increasing (while the majority of the population is still illiterate).
- Investments and new technology are being introduced. A hydroelectric plant has been constructed and all villages are connected to the grid. Channel projects irrigate considerable new areas for cultivation (mainly fodder production and farm forestry) and provide employment for men.. New livestock breeds and crops are being tested.
- Old institutions of household-leaders, elders and informal networks have been transformed into a more "modern", but still flexible, system of organisation at the village and watershed level, in which the AKRSP concept of village organisation has been central.

At the inter-village level the Basho Development Organisation (BDO) is the most important body. In 1998/99 the BDO coordinated an application for concessions to harvest dead fallen and dead standing timber through the DFO, Skardu and the Chief

Conservator of Forest, receiving seventy permits. As noted in the 1998 report, this was an area in which villagers had experienced difficulties in overcoming bureaucratic barriers. However, critical questions were being asked about the implementation of the felling, the distribution of timber, inappropriate fringe-benefits etc..

The BDO has introduced rules ("*ek chula, ek bakri*") limiting the number of animals in village commons (grazing areas close to and used by a single village). The decision was apparently motivated by concerns about both equity among households and the range condition in the village commons. In this way the BDO and communities are gaining experience with collective decision-making for resource management with a long-term perspective.

The BDO is party to the "*Forest & Wildlife Conservation Plan for Basho Valley Community Conservation Area, District Skardu*", Basho Village Conservation Committees, February 1999 (under the IUCN Biodiversity Conservation Project). The BDO is expected to play a major role in its implementation. While the plan may appear to be as yet rather loosely grounded locally, it represents a possible framework for the BDO and conservation committees at a more decentralised level. It complements the AKRSP-NLH project, which focuses primarily on learning and understanding, with limited management action. The BDO stands between households and villages on the one side, and external agents on the other. Where there is a strong conflict of interest between insiders, or between insiders and outsiders, as in the case of timber utilisation, the position becomes difficult, almost untenable[8]. Some cursory observations appeared to indicate that it is increasingly difficult to bridge differences of interest among upper and lower villages, for instance with respect to forest rights and new infrastructure development in the upper part of the watershed. It also touches upon the NLH-AKRSP research involvement, which is concentrated in the upper area. The participation of the major village, Matillo on River Indus, was on the agenda in 1998, but now appeared to have disappeared from the picture.

Basho - Khaplu comparison

Even if the natural conditions of Basho and Khaplu are relatively similar, their history and current situation present considerable differences (yet, in some respects the Matillo village of Basho appears more similar to Khaplu). A matrix overview of major differences is presented in Appendix 6. The references to Khaplu are mainly to the Hunjor broq which was visited during a one day field visit, involving a transect with local AKRSP staff and two key-informants from Khaplu[9] (the limited empirical basis and quite preliminary nature of the comparison should be noted).

Population growth and farmland fragmentation appear to be severe problems in both areas (and are presented as such by local people). The Khaplu area seems to have reached another step

[8] A frank, perhaps half-joking, villager said about felling of green timber that, "*The difference between before and now is that before, when we needed timber we went to the forest and felled it. Now, when we need timber we go and ask the BDO, and the BDO says 'no', and then we go and fell timber!*".

[9] Thanks to Sayed Ali, FMU Manager, and M. Ibrahim Social Organiser, FMU Khaplu, and to Kacho Fazelay Hussain and Kacho Zahid Hussain.

of economic and institutional development compared to the seven upper villages of Basho watershed. Most cultivation possibilities of the landscape have been used in a farming and agro-forestry (around Khaplu town) economy. In pasture management there are examples of more robust institutions that have developed under the Raja government (which is geographically closer). Land is managed and developed in accordance with old, recorded land rights. This is also true when it comes to rights to pastures, which are sub-divided into a handful of larger areas with old *khlas'es* and clear rights. The village or hamlet is an important body of land use and land rights. Apparently solid and simple lease systems are used when outsiders want access to pastures and the *khlas'es*. Land and water conflicts are apparently few, and conflict resolution is managed by small and solid institutions (with an individual, the *"Raja of the Broq"*, as the central figure).

In Basho there are still considerable areas of uncultivated arable land and irrigation water. Husbandry is relatively more important. Institutions are developing, but most of these seem young and only partly accepted. Land is managed on the basis of recorded rights, but ad hoc agreements, exchange, borrowing and even occupation are frequent - especially in the pastures. Local (seldom recorded) changes of rights are frequent. Pastures tends to be sub-divided into smaller units with a relatively higher number of *khlas'es*. The household or cluster of households (*Norass* co-herding group) is of greater practical importance, even if the recorded rights refer to villages. Land disputes are frequent and the domestic conflict resolution institutions are active and potent. The general institutional picture is complex and unclear.

While mobility and market contact has been a part of Khaplu reality for centuries (it also has its own *bazaar*), Basho has a past of relative isolation. It appears that it may enter more abruptly into a market-related economy, or a situation of considerable out-migration, without first developing a more intensive agricultural production. Basho goes into the future with a capital represented by the natural forest. Khaplu has no forest (left). Here, firewood comes from agroforestry, but even artemisia and dung is used.

3.1.5 Implications

One of the implications of the year's work in Basho, and the preliminary comparison with another site, is that AKRSP face quite different ecological end socio-economic conditions in different watersheds of Baltistan. This means that the approach to alpine resources management must be empirically based and flexible in terms of the technical support and organisational development effort. This is further brought out by the dynamic changes in a highly decentralised management system for livestock-pastures found in Basho. The fragmented, patchy nature of the resources appear to make centralised interventions "difficult", both in terms of making strategic choices about them and in terms of determining their impact. This is also the case for the cluster level organisation (BDO).

Basho stands out - in Baltistan - due to its significant natural forest resources. The forest plays an important role in people's emerging coping strategies, both subsistence and market-oriented. The sustainability issue is a burning one: the findings on resource reproduction and extraction appear to indicate that the forest is being degraded (ref. 3.3). Yet, the project

should not support pre-conceived notions about how much and what kind of forest people want to have. Work so far, also by AKRSP independently (Jawad, 1999), has shown that local people's use and perceptions of the forest are complex and varied. To clarify local ownership to forest is probably a key to sustainable management. It will also be critically important in a situation where local people may get legal rights to broader (commercial) benefits. Jawad (ibid.) recommends a co-management arrangement at the level of village or groups of villages. The same is the idea in the recently produced conservation plan for forest and wildlife in Basho (IUCN, BDO, NAFWPD, AKRSP, February 1999). It requires careful consideration of local perceptions and practice to define such right holder groups and geographical areas without creating conflicts. The complexity of human and livestock movements within the agro-silvi-pastoral production system must also be considered. Grazing is an important aspect of forest use. The forest management issue is multi-layered and needs attention across a wide disciplinary range: gender study, local knowledge, local poverty and other forms of differentiation, village and watershed organisation, and policy.

There are disputes about the Basho Development Organisation's legitimacy as representative of all villages, and maintaining or increasing trust among villagers is a major challenge for the BDO. Yet, the BDO continues to be an important agent with respect to shared matters in the watershed. In spite of difficulties, the BDO leads the major on-going resource management projects in the valley (irrigation and land development), represents a push to create new opportunities for people (for example, in "eco-tourism") and brings together representatives of all upper villages for discussing and resolving issues. In presentations and discussions with villagers on 4 June 1999, NLH researchers discussed issues and choices in sustainable management of pastures and forests. As yet, there does not appear to be other agents/forums better positioned than the BDO to make such choices for the Basho Valley, and oversee their implementation.

3.1.6 Suggestions for future work

The component on institutions and organisations addresses issues that deserve further follow-up, particularly:

- Evolving institutions in alpine pasture management, linked to the focus on range conditions and the productivity of vegetation and livestock
- Institutional and organisational development, including the role of the BDO, in forest management
- Further documentation of some aspects of land tenure, including sale and purchase of land, that are central for the project as a whole
- Initiation of comparison with one neighbouring watershed (for example through case studies implemented primarily by AKRSP staff)

As per the project document, in the coming two years the project should move more in the direction of training, learning and application of new methods. The findings and analytical points from the Basho study should be strengthened and then used as a case in experience sharing and competence building through further study by AKRSP staff. It is

important to link the work with AKRSP-Baltistan's implementation of the strategy for integrated NRM, and to include AKRSP experiences with NRM pilot sites in the discussions.

References:

IUCN, BDO, NAFWPD, AKRSP, February 1999: *"Forest & Wildlife Conservation Plan for Basho Valley Community Conservation Area, District Skardu"*

Jawad Ali, 1999: *Saving the last juniper : the role of community institutions in forest management : a case study from Basho valley, Skardu, Baltistan.*- Skardu : Aga Khan Rural Support Programme, III, 32 s.

3.2 Pastures, livestock and biodiversity management

Pastures and livestock

Veronika Seim, Mohammed Afzal, Åge A. Nyborg, Øystein Holand, Mohammed Abbas and Mohammed Ali.

3.2.1 Objectives

Based on recommendations in Report No. 3 1998 «Pasture, Livestock and Biodiversity», the main goals for the field season 1999 were to:

- measure biomass production and quality of the fodder resource
- study animal responses related to variation in energy intake and pasture quality
- quantify possible effects of trampling on soil physical factors and plant diversity
- map movement patterns during mountain summer farming
- study nutrient transport from pastures to cultivated fields
- map soil and vegetation types

3.2.2 Approach

The field work was carried out by the joint AKRSP-NLH team during the summer months June-September 1999.

3.2.2.1 Biomass production and quality of the fodder resource

We selected 5 sites (Ranga, lower Bondipiri, higher Bondipiri, lower Chalabath and higher Chalabath) for measuring biomass production and fodder quality in time and space (Appendix 7). The soil and topography at the sites was described (Appendix 8).

a) Biomass production

Biomass production was measured using three movable cages (1 m^2 quadrates) at each site. Every 4th week we cut the vegetation inside and outside the cages (0.5 m^2 quadrates) and moved the cages randomly within the sites. Green and dead biomass was separated and dominant species of the green biomass was sorted out. Total green biomass production was calculated. We estimated off-take of green biomass by cutting 0.5m^2 quadrates inside each cage to the same height as outside the cages. The plant material was sun dried and later dried at 100 °C for 48 hours for determination of dry matter content.

b) Quality

We sampled plant material of six species commonly grazed by livestock (Seim, 1999) at sites representing different altitude levels every 4th week. Three parallels of each species were sampled at three fixed spots within the sites. The plant species were sampled at the same five sites used for measuring biomass production. In addition plants were sampled on the ridge behind Forest Hut. Dr. Kåre Arnstein Lye, NLH

has identified the plant species. Quality, expressed as fibre content (ADF, NDF and ADL), crude protein (CP) and content of ash will be analysed at the Research Laboratory at the Agricultural University of Norway.

c) *Vegetation analysis and soil sampling*

We conducted three vegetation analyses ($1m^2$) outside each cage at the start of the production study, measuring average and maximum height of the vegetation, and percentage cover of vegetation, litter and barren ground. In addition, frequency, measured as occurrence within a 100 points grid, phenological stage and the percentage cover of most plant species were recorded.

For each site 3-4 undisturbed soil cores were sampled from the upper 5 cm of the soil. The soil samples were weighed and dried and brought to NLH for chemical analyses at the Soil Science Lab. The results of these analyses will give information on soil water content at the time of sampling, bulk density of the topsoil and nutrient content and pH of the soil.

3.2.2.2 Animal responses related to variation in energy intake and pasture quality

Twenty-four adult (2-6 years old) milk-producing goats from the same *norass* system (herding group) within Nazimabad village were selected for the study. Before start of the experiment milk yield was measured morning and evening for four days and body weight measured. We divided the animals into two groups according to age, number of offspring, reproductive status, body weight and milk production. The animals in group 1 were supplementary fed 300g concentrate (local grown barley) per day (150g morning and evening) while the other animals in group 2 were a control. The total experimental period lasted for 40 days.

Half of the animals (6 from group 1 and 6 from group 2) were herded to Bondipiri pasture whereas the rest (6 control and 6 concentrate) grazed in Kholishai pasture. The local herders assumed Bondipiri to be a "good" pasture, while Kholishai was classified as a "poor" pasture. Both grazing areas were about 1 hectare, north-east facing and situated 3,600 – 4,000 m.a.s.l. (Appendix 9). The spatial distribution and composition of the vegetation of Bondipiri and Kholishai were documented based on vertical transects.

a) Production

Milk yield was measured morning and evening every week and body weight measured four times during the experiment. Milk samples were collected every 2nd week. The milk samples were preserved (D&F Broad Spectrum Microtabs II) and later analysed for content of fat, protein and lactose. Samples of the barley given as supplement were brought to NLH for chemical analyses.

Effect of supplementary feeding and pasture quality on milk production and body weight gain were tested using General Linear Models (GLM) (SAS, 1989). In addition, effects of initial body weight, age, month of lactation and previous number of kids on milk production and body weight gain were tested.

b) Behaviour

Both groups of animals were scanned (Martin & Bateson, 1994) every 15 min. during the entire

daily grazing period for 3 days spread out during the experiment. The activities grazing, standing and lying down, were recorded. Statistical analysis procedures were run using GLM (SAS, 1989).

3.2.2.3 Effects of trampling on soil physical factors and plant diversity

To study the effect of trampling on plant diversity and on soil structure we randomly established 3 permanent enclosures (6x6m^2) on silty Cambisol, formed in loess over glacial materials in Bondipiri pasture.

Within each enclosure we established a 3x3m latin square experiment with 2 treatments and one control. The treatments involved trampling (heavy and light) with an iron rod weighing about one fourth of an average goat (4kg) with a diameter representing a goat-clove. Treatments were carried out at 3 weeks intervals.

Three undisturbed soil cores from the topsoil (2-7cm) in each enclosure were sampled to monitor field soil water content (FWC) and dry bulk density (BD) before the treatment started and during the second and third treatment. The dominating soil type at the enclosure sites was documented by a detailed soil profile description and soil samples for chemical analyses were collected from the soil pit.

Vegetation analyses of all quadrates were carried out before the treatment started, measuring frequency distribution of all vascular plants and percentage cover of major plants. In addition, three fixed quadrates (1x 1m^2) outside each enclosure were randomly established and vegetation analyses carried out.

3.2.2.4 Movement patterns during mountain summer farming

To identify constraints governing the movement patterns observed, we collected information about movement patterns, seasonal use of broqs and khlases, number of *noraiss* groups and number of members and animals within groups involved through interviews with VO and key informants in each village at village level.

3.2.2.5 Nutrient transport from pastures to cultivated fields

This pilot study focused on nutrient transport from pastures to cultivated fields by comparing nutrient status (important soil nutrients) and crop yields at agricultural fields belonging to households with different livestock density.

Two households were selected. Criteria for selection were: 1) Two households with big difference in livestock density (number of animals per unit agricultural land), 2) Agricultural fields with same type of crop in Sultanabad village and Ruskin broq, 3) No use of chemical fertiliser.

Soil samples were collected from wheat fields in the village and from fields with barley and peas at Ruskin. AKRSP has collected crop samples for measurement of grain yields and crop residues from the same fields at harvest time. The soil samples will be analysed for major soil nutrients, pH and organic matter content at the Soil Science Laboratory, NLH.

3.2.2.6 Preparation of soil and vegetation map

The mapping in 1998 was a rough survey of the lower part of the valley. In order to have a functional research and range management tool

a more fine-grained map was made. Instead of making two different maps, the fundament of a land information system based on soil, vegetation and landscape variation was produced. The map polygons were delineated on the bases of soil and terrain variation. The polygons were then subdivided if the vegetation type differed. In most cases the soil type polygons represented one vegetation type. The mapping was done by augerings along transects and by observing soil variations along irrigation channels. Mapping units were composed on the bases of the soil investigations from 1998 and this year. Documentation of the mapping units was taken from last years soil profile descriptions and analysis data.

3.2.3 Main findings

3.2.3.1 Biomass production and quality of the fodder resource

a) Biomass production

The results are not yet available for presentation.

b) Quality

The sampling scheme of six selected plants at six different sites has been going on from late May til mid July. The plants sampled are *Koeleria Macrantha* (ledeb) (Shult), *Carex* sp., *Elocharis* sp., *Festuca* sp., *Bistorta affinite*, *Thymus liearis liearis* (Benth). The cell wall structure (NDF) was low indicating high potential digestibility but increased as the plant mature throughout the sampling period (Table 1). Crude protein (CP) was generally high and decreased throughout the season (Table 1). There was a tendency of lower NDF content and higher CP values at higher altitudes, indicating different phenological stages.

c) Vegetation analysis and soil sampling

Vegetation analysis was conducted in three randomly chosen 1 m^2 quadrats close to each cage. Average slope, cover of vascular plants, litter and barren ground at each site are given in table 2. The frequency of each plant-species will be presented in a final report.

Table 1: Content (g/kg DM) of ash, fibre (NDF, ADF and ADL) and crude protein (CP) in plant material from six species collected at different sites and different time

Species	Sampling site	Date	Ash g/kg	NDF g/kg	ADF g/kg	ADL g/kg	CP g/kg
Koeleria Macrantha	Forest hut	30/5	103	403	207	15	182
		30/6	105	440	225	24	130
	Bonipiri low	29/5	107	314	151	15	217
		28/6	93	361	179	18	138
	Bondipiri high	14/6	103	326	166	15	202
	Chalabath high	7/7	81	378	193	15	148
Carex sp.	Forest hut	30/6	111	353	153	17	134
	Ranga	31/5	81	437	194	18	168
		30/6	90	455	195	20	137
	Chalabath low	6/7	97	395	162	8	193
Elocharis sp.	Ranga	31/5	54	543	214	16	128
		30/6	63	525	238	20	124
Festuca sp.	Bondipiri low	29/5	78	239	119	8	120
		28/6	128	413	209	19	106
	Bondipiri high	14/6	76	438	255	10	158
	Chalabath high	7/7	83	400	194	14	157
Bistorta affinite	Bondipiri high	14/6	65	242	181	59	168
	Chalabath low	6/7	81	237	180	55	157
	Chalabath high	7/7	61	220	174	54	134
Thymus liearis	Bondipiri low	29/5	110	268	184	37	160
		28/6	99	314	232	55	95

Table 2: Slope (%) and mean cover (%) ± SD of vascular plants, litter and barren ground of the nine squares outside the cages at each site.

3.2.4	Average slope		Cover of vascular plants		Litter		Barren ground	
Site	**%**	**± SD**	**%**	**± SD**	**%**	**± SD**	**%**	**± SD**
Ranga	0	0	26	4.9	8	2.7	67	6.8
Bondipiri, low	40	8.7	22	3.5	14	21	64	20.9
Bondipiri, high	70	0	22	6.7	25	12.7	53	12.5
Chalabath, low	0	0	30	15	27	13.2	42	19.7
Chalabath,high	73	5	44	7	14	17.5	42	15.4

Soil water content varied from 31.5 % on the river-plain Ranga to 0.5 % in lower Bondipiri and while dry bulk density varied from 1.48 g/cm^3 at the Ranga to 0.47 g/cm^3 in upper part of Chalabath.

3.2.4.1 Animal responses related to variation in energy intake and pasture quality

a) Production

Average age of the goats in the "control" group and "concentrate" group were 4.1 and 3.7 years, respectively. The animals in both groups started, on average, their lactation period in early April and the number of previous lactation periods were 1.8 for the control group and 1.3 for the concentrate group. Mean milk production at start of the experiment was 302± 142 ml/day (SD) for the control animals and 305 ± 109 ml/day (SD) for the supplementary feed animals. Average body weight for the animals in the control group was 28± 4.4 kg (SD) while the animals in the concentrate group weighted 27 ± 4.5 kg (SD).

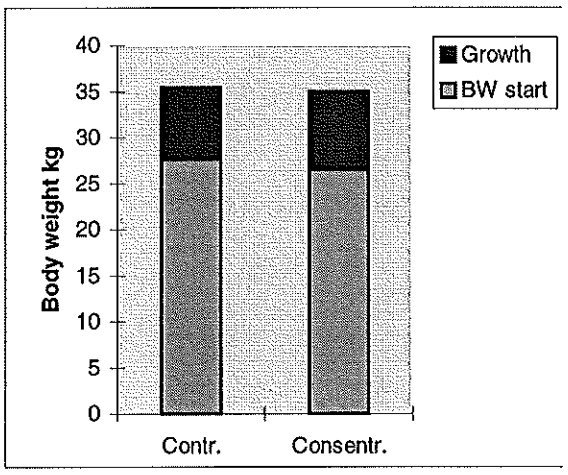
During the experimental period the daily milk production of the control group increased with 60 ml, while in the barley fed group the increase was 186 ml/day (

Figure 5a). Average body weight gain was 7.8 kg in the control group and 8.5 kg of the group fed concentrate (

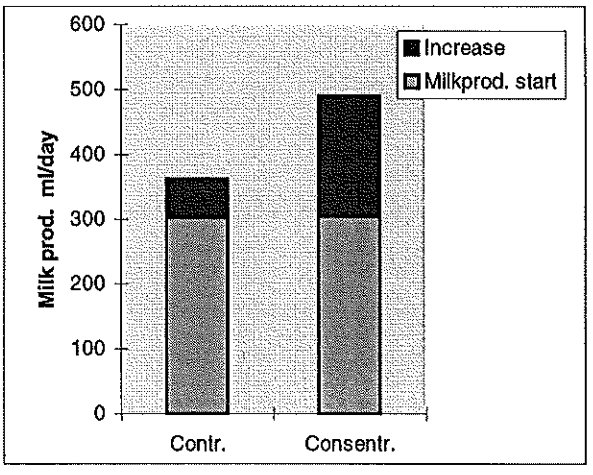
Figure 5b).

Figure 5: Mean body weight (a) and milk production (b)

Given at start and changes during the experimental period in the control group and the group supplemented with concentrate



1 a



1 b

We found significant effect of supplementary feeding on milk production (r^2=0.41, p= 0.007), but no effect on body weight gain. «Pasture-quality» was found to have no effect on either milk production or body weight gain. Neither the milk-production nor the body weight at start

of the experiment had any effect on milk-production or body weight gain within groups. Age, month of lactation period and previous number of kids had no significant effect on milk-production or body weight gain within groups.

Protein and lactose content of the milk samples did not show variation during the experimental period, nor between treatments (Table 3). The fat analyses were unreliable and are therefore not presented. The barley given as supplement will be analysed.

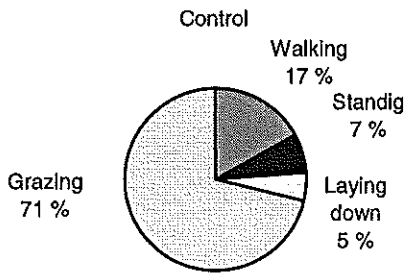
b) Behaviour

We did not find difference in activity between animals grazing in the «good» and «poor» pasture. Both groups spent the same amount of time grazing (71 %) and walking (17 %) and almost the same amount of time standing and lying down (Figure 7).

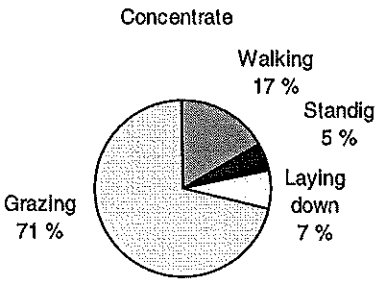
Table 3: Content (% DM) of crude protein and lactose in goat milk.

Date	Crude protein		Lactose	
	Control	Concentrate	Control	Concentrate
2. June	5.0	4.7	4.8	4.7
25. June	4.8	4.5	4.7	4.7
10. July	5.1	4.7	4.5	4.6

Figure 7: Activity budget for the control group a) and the concentrate group b) during the experimental period



2 a)



2 b)

3.2.4.2 Effect of trampling on soil physical factors and plant diversity

A sketch of the three enclosures and the distribution of treatments within the enclosures are given in Appendix 10. Average field soil water content (FWC) and dry bulk density (BD) from the three soil cores sampled at 2-7 cm depth inside each enclosure are given in table 4. Sampling was conducted before the treatment started and during the second and third treatment rounds. At 2-7 cm depth at treatment

times (mean of 3 samples) sampled in each enclosure (F1. F2, F3) before the treatment started (10/6, during the second (1/7) and third (22/7) treatment.

Table 4: Field soil water content (FWC) and dry bulk density (BD)

Date	F1		F2		F3	
	FWC (%)	BD (g/cm^3)	FWC (%)	BD (g/cm^3)	FWC (%)	BD (g/cm^3)
10. June*	2.4	1.01	2.0	1.3	1.3	0.99
01. July	1.0	1.10	1.0	1.14	1.1	1.12
22. July**	6.8	1.06	5.7	1.15	5.9	1.19

* Surface crust included in sample.

** 4 rainy days prior to sampling.

The soil profile description (Appendix 11), and several augerings around the site, revealed new findings concerning soil development in this area. Evidence of decalcification (dissolution and downward transport of lime) and clay illuviation (downward transport of clay particles) suggests that soil development had an optimum in a period where the climate was more humid. A dry climate and an addition of a loess layer, which today can be considered as the active soil, have preserved these 'relict' soil layer that we now find at 50 to 120 cm depth.

Barren ground covered 2/3 of the quadrates inside the enclosures, whereas green plants and litter covered about 20 % and 10 % respectively (Table 5). Mean cover of both vascular plants, litter and barren ground was quite similar in the three enclosures.

Table 5: Slope and mean cover (%) ± SD of vascular plants, litter and barren ground

Given for the nine quadrates inside each enclosure.

3.2.5	Slope	Cover of vascular plants		Litter		Barren ground	
Enclosure no.	%	%	± SD	%	± SD	%	± SD
1	35	24	3.0	12	2.6	64	2.5
2	50	22	2.6	9	1.8	69	3.8
3	80	22	2.6	9	3.1	69	3.8

Mean cover of vascular plants, litter and barren ground was rather similar inside and outside the enclosures.

Since change in the soil structure and vegetation due to trampling takes time, this study will continue for at least 3 years and the final results are expected to be available in year 2001.

3.2.5.1 Movement patterns during mountain summer farming

Summer farming is an important and integrated part of the production system, enabling the villagers to utilise the rich high altitude pastures, as seen in many marginal mountain areas world-wide.

The majority of the livestock owners are practising a several-step migration to temporary summer settlements at higher altitudes. Mapped movement patterns for all *noraiss* groups at village level are given in appendices 12 and 13. This seasonal migration to higher pastures is a strategy for utilising the natural resources for multi-species grazing, and related to seasonal changes in the production and quality of forage along an altitudinal gradient (Holand et al., 1999).

In total we have found 37 broqs in Basho valley (Appendix 12). 11 of these are classified as lower broqs and 29 as higher broqs. The lower broqs have a multi-purpose function, mainly by increasing the area of land under cultivation and for grazing young and weak animals and sheep, goat and lactating cattle in the surrounding pastures (Seim, 1999). Elevation limits cultivation at the higher broqs. The higher broqs are therefore mainly production units making it possible to utilise the more remote higher pastures for milk and meat production. Free ranging animals mainly graze the uppermost alpine pastures.

The date of moving to broqs is decided by the village elders, and depends on grazing pressure close to the village, vegetation growth at the pastures and when weeding of cultivated fields in the village is finished. Heavy grazing on the fields, health condition of the livestock and heat in the villages are also taken into account. Most *noraiss* systems move to the first level broq in the middle of June. The *noraiss* groups do from 3 to 7 movements to new settlements during one season. Critical winter grazing land and crops are protected during the growing season by scheduled livestock movements and limiting grazing of the meadows and pastures close to the villages (Steinsholt et al., 1998).

Relatives and/or neighbours join together in *noraiss* groups (herding co-operations) and the herding responsibility is circulated in a fixed order among male members of the households (Seim, 1999). In the eight villages, 20 - 23 *noraiss* groups are formed depending on the season. Small ruminants are herded strictly together and guarded through the day, whereas lactating and weak cattle are being directed to the grazing areas in the morning and gathered and returned for milking in the evening (Seim, 1999). This practice is well adapted to the grazing behaviour and diet selection of the different species (Seim & Holand, 1999). Healthy and non-milking large ruminants are free ranging at higher altitudes throughout the summer season, but are pushed upwards as people and herded animals move to the higher broqs (Seim, 1999).

This multi-species grazing system may increase animal output per unit area, since small ruminants depend on high quality forage whereas large ruminants are better adapted utilising bulk forages of lower quality. The division of the livestock practised is therefore a strategy for an effective use of the pastures and to reduce the labour

requirements of herding where small ruminants use the pastures at a higher altitude followed by cattle (Holand et al., 1999). Since small ruminants are normally herded to the pastures at higher altitudes, cattle will follow and graze pastures earlier grazed by small ruminants when they are moving to the higher broqs.

Their autumn retreat towards the village is triggered by low temperature, reduced biomass production and forage quality. The lower broqs are used until crops are harvested, normally during the end of August to mid September, and animals are held in common waiting areas at lower elevation in order to limit grazing of the pastures close to the villages, meadows and harvested fields which are grazed during the winter. When the weather is cold and snow prevents grazing, the animals have to be stall fed with hay and crop residues.

This very complex and dynamic seasonal grazing system, as well as the daily vertical movements and herding practice are adaptations to the low availability of palatable forages in Basho, the rapidly changing vegetation growth during the season and differences between years (Seim, 1999).

3.2.5.2 Nutrient transport from pastures to cultivated fields

The selected households were characterised by a rather similar ratio between number of animals and area of cultivated land:

- *Household 1: 1 cow, 4 small ruminants, 4 kanal wheat in Sultanabad, in addition 1 kanal peas and barley in Ruskin*
- *Household 2: 7 heads of cattle and 23 small ruminants, 16 kanal (mainly wheat) in Sultanabad, in addition 10 kanal peas and barley in Ruskin*

From earlier interviews with villagers in Sultanabad we knew that chemical fertiliser is not used on fields in the village. Sporadic use of chemical fertiliser on broq fields in previous years was confirmed during an interview with one household.

Household 1 reported shortage of manure from its own livestock. Relatives provided additional manure in exchange for manual labour. Household 2 used own farmyard manure as fertiliser, but felt that the amount of manure used was not sufficient to cover the crop requirements. Signs of N-deficiency could be seen in both local wheat fields, but not in fields where peas were mixed with the wheat. This suggests that N-input is generally too low, either because of insufficient amounts of manure or N-depleted manure. The soil analyses are not yet available.

3.2.5.3 Vegetation and soil type mapping

The map is not yet available for presentation, but the mapped area included pastures south of Ruskin Nallah on the west side of the valley, pastures and forest areas south of Goriaq on the east side of the valley and the valley floor south of the boulder area. The moraine south of the Selchen meadow marks the southern boundary of the map.

Information at polygon (map unit) level: Size of map unit, soil types and their % representation within the map unit, dominating slopes (min-max), % rocks and boulders on surface, geological deposit type, vegetation type, land use.

Thematic soil information: Soil nutrients (low, medium or high content of specific nutrient), other soil chemical parameters (pH, organic matter content, etc.), soil physical parameters (surface texture, depth to root restricting layers, depth to groundwater table, soil structure, etc.), others

(drainage class, classification, soil moisture regime, etc.).

3.2.6 Current status

The fieldwork went according to our plan with some minor adjustments. The intentions and objectives for the field season were met. The follow-up during the autumn field season by the AKRSP team members, and logistic support throughout, have been excellent. Our aim is to publish the production experiment and the findings related to the summer migration movement pattern during the coming year.

3.2.7 Further work

These are some suggestions for further work which will be decided upon during the activity planning process ahead:

1) Following up the trampling treatments in enclosures. Treatment has to be conducted in Summer 2000 and Summer 2001. Vegetation and soil analyses have to be carried out in 2001.

2) Year round follow up of the goat experiment. This will give valuable base line data on the yearly milk production and body weight cycles and may help us to identify production constraints. The follow up also has to include reproductive performance, birth date and kid growth.

3) Extend the pilot project on nutrient transport from pastures to cultivated fields.

4) Complete the map describing the summer movement patterns.

5) Follow up the autumn and winter "story". Mapping of winter pasture dynamics and rights and calculation of winter fodder quantity and measurements of quality.

6) Measuring body weight (growth) through the year of goats, sheep, cattle, lambs, kids and calves.

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Biodiversity

Mats Finne, M. Younus Shehzad, Ghulam. Abas, Per Wegge, Mohammad Abbas

3.2.9 Objectives

The objectives of this year's field work were to survey the ibex population and to collect information concerning livestock depredation in the valley.

3.2.10 Approach and activities

Ibex survey

Because ibex congregate in larger mixed herds at lower elevations during the rut in late autumn/winter (Roberts 1997; Ali pers. comm.), this is the best time to census the population. Although the segregation is less pronounced in the Himalayas than in the Alps, sexes are more segregated in summer (Fox et al. 1992), with old males positioned at higher elevations than females and kids (Abas pers. comm.). This may cause a bias when carrying out a census in summer, because the male habitats are then more inaccessible. Data on fecundity and kid survival may be collected during all seasons.

This year information on fecundity and kid survival was collected in late May, just before the birth of new calves, and the winter survey will be conducted in early December, in co-operation with IUCN. In spring ibex were censused by one team during 7-8 days. In winter we will divide the valley in 3-5 sub-areas which will be censused simultaneously. The animals will be located with the use of binoculars (8-10x) and spotting scopes (40x) from fixed observation points.

Livestock depredation

In co-operation with AKRSP and IUCN, M. Younus Shehzad, Honorary Wildlife Officer, recorded information about livestock losses by interviewing 20 families from 5 different villages in Basho. The work was carried out during March 1999.

A direct monitoring of livestock depredation started 15 June 1999, and will hopefully last throughout 2001. The field work is conducted by two local volunteers, 1 Honoree Forest Officer and two Wildlife Village Guides specially trained by IUCN. They have divided the valley into five sub-areas, and all carcasses found are investigated as soon as possible after depredation has taken place. They record 1) species/age/sex of depredated animal, 2) species of predator, 3) type of grazing area, 4) if day or night, 5) if predator was killed, 6) owner of depredated animal, 7) if animals were herded, 8) age and sex of herder, 9) date and 10) geographical location.

3.2.11 Main findings

Because the purpose of the field trip this summer was mainly to get familiar with the area, to plan the ibex survey in winter and to initiate monitoring of livestock depredation, only some preliminary results will be presented at this stage.

Ibex survey

During 7 days in late May 1999, we observed 42 ibex in 11 groups (Table 6). Possible double counts were excluded from the material. Mean group size was close to 4 individuals (min. 1, max. 8). Number of kids/100 females were 43, and 5 of the males were judged to be trophy sized (7 yr. or older).

Table 6: Ibex observed by Abas, Finne and Hussain 22.-30. May, 1999.

Sex/age	*Gr.1*	*Gr.2*	*Gr.3*	*Gr.4*	*Gr.5*	*Gr.6*	*Gr.7*	*Gr.8*	*Gr.9*	*Gr10*	*Gr11*	**Tot**
Kids(<1 yr)	2			2		1			3	1		**9**
Females(>1yr)	3	1	3	5		2		1	2	1	3	**21**
Males(>1-6 yr)	1					1		1	1	2	1	**7**
Males(>6 yr)					2		1		2			**5**
Total	**6**	**1**	**3**	**7**	**2**	**4**	**1**	**2**	**8**	**4**	**4**	**42**

Table 7: Total predation of livestock from 20 families in Basho1996/97. Based on interviews by M. Younus Shehzad March 1999, in co-operation with IUCN/AKRSP

Species	*Wolf*	*Snow leopard*	*Lynx*	*Unknown*	**Total**
Small ruminants	40	48	6	9	**103**
Large rum. male	13	0	1	0	**14**
Large rum. female	18	0	0	0	**18**
Total	**71**	**48**	**7**	**9**	**135**

Livestock depredation

According to the interviews by M. Younus Shehzad, 20 families lost all together 134 animals during 1997 and 1998 because of predation, 103 small ruminants (goats and sheep) and 32 large ruminants (Table 7). The large ruminants were almost exclusively killed by wolf *(Canis lupus)*, while the losses of small ruminants were divided equally among wolf and snow leopard *(Panthera unica)*. The lynx *(Felis lynx)* was responsible for only six kills, mainly small ruminants.

Wolf faeces were observed at Goriaq, approximately two km from the closest village. Local people claimed that one litter of four cubs had been raised approximately one km from the uppermost village Sultanabad. We observed tracks of snow leopard in Metsik nallah, at approximately 3,500 m. A dead snow leopard, probably killed by an avalanche, was found when the snow melted in late summer (pers. comm. Veronika Seim).

3.2.12 Discussion and further work

Because of too low survey effort, and methodological difficulties previously mentioned, the number of ibex censused this spring is not considered to be the total population. A total count will be conducted in winter.

Number of kids per female in comparable studies in the Northern Areas is highly variable. In winter counts in Hushey valley and Skoyo-Karabathang-Basingo valleys in 1995, 1996 and 1997 the number of kids per 100 females varied between 19 and 75 (Hushey Village Organisation 1998, Skoyo-Karabathang-Basingo Conservation Committee 1998). In Skoyo-Karabathang-Basingo valleys, which are situated

next to Basho, no more than 31 kids/100 females have been registered during the three years of winter counting. Last autumn 43 kids/100 females were registered in Basho, and this spring 43 kids/100 females were counted. The reason that the same number of kids/100 females was recorded both autumn and spring is probably because only a sample of the population is censused, but it indicates a fairly good winter survival and an overall good reproduction rate in the area.

If the ibex population density in the Basho watershed area is lower than comparable areas in northern Pakistan, this may be caused either by a previous high hunting pressure, or by some other factor hampering the reproduction and growth of the population. An intensive winter survey executed during a short time span will hopefully reveal the population size, and data on reproduction rate and population structure may clarify whether the population is recovering or stagnating.

As during the field season of 1998, signs of both wolf and snow leopard were found this year. The investigation of livestock depredation revealed that both are important predators on livestock. A more intensive approach to livestock depredation monitoring will hopefully give more information on where, when and how the livestock is lost. As emphasised in the previous report, an attempt should be made to survey the predator populations involved in livestock depredation. A survey should be conducted when the ground is snow-covered, or with the use of remote camera trapping.

It is suggested that the wildlife component of the AKRSP/NLH project continues to focus on two objectives:

a) Collecting data on ibex (*Capra ibex sibirica)* demographic parameters and population density as a basis for a management plan for the harvesting of trophy males, and
b) Investigating the livestock depredation and predator densities, and try to make suggestions on how to reduce livestock losses.

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3.3 Forest management

Heidi Asbjørnsen, Jawad Ali, Knut Velle, Wazir Shabir, Jakob Thompson, Snorre Synnestvedt

3.3.1 Objectives

Based on the field observations and forest inventory results obtained by Noragric-AKRSP's forestry project in 1998 (see NLH-AKRSP, Report No. 4 1998, by Knut Velle), the following primary objectives were pursued in 1999:

1. Establish a field experiment using fenced enclosures to assess the impacts of grazing, moisture, and seed source on natural regeneration
2. Conduct a field survey to evaluate the natural forest regeneration in the upper Basho watershed (M.Sc. study)
3. Expansion of the natural forest inventory to include three additional forest areas
4. Restoration of the tree nursery in Sultanabad.
5. Estimation of wood consumption using a model based on approximations and informal interviews with local people
6. Propose recommendations for improving forest management, agroforestry, and research activities in the region.

3.3.2 Activities and results

Considering the wide spectrum of different topics addressed by the forestry project, and the importance of maintaining a clear and coherent presentation of each research component, each of these components will be discussed separately according to their particular objectives, approach and activities and major findings. A final discussion at the end will integrate the findings from the different research areas and present joint recommendations for future work.

1: Regeneration field experiment

Specific objectives

The initial forest inventory conducted in 1998 indicated a lack of adequate natural regeneration of the dominant pine species, *Pinus wallichiana*. In order to address this problem, a field experiment was initiated with the objective of identifying potential causal factors of the observed poor regeneration.

Approach and activities

Considering the high complexity of causes that may contribute to the regeneration problem, the research approach focused on those factors identified as likely to be the most pronounced and which could also be assessed within the time frame of the project, including: grazing, moisture availability, and seed supply. Five fenced-in enclosures, 10 x 10 m each, were established in four forested areas (Durom, Foriqcho, Ranga, and Sari) within the upper Basho watershed. A regular pattern of water catchment channels, consisting of four lines of 4 m long ditches, were dug inside and immediately adjacent to each enclosure. Seeds were sown directly in the ditches. This research design allows for an assessment of the effects of the following critical factors on regeneration: 1) natural seed supply versus direct sowing, 2) soil moisture due to natural water supply versus a water catchment system, 3) current grazing and trampling pressures versus protection by fencing.

Major findings

By the beginning of June 1999, most of the plot enclosures had been established as planned. At the end of June there was still no germination and no observable differences inside and outside the enclosures. Results from the enclosure experiment are anticipated by next year, with the precondition that the seeds used were viable and germinate successfully.

2: Natural regeneration field survey and assessment (M.Sc. Study)

Specific objectives

The objective of this study was to evaluate the natural regeneration of *P. Wallichiana* and other associated species (birch and juniper) with respect to micro-site conditions and landscape features, using a transect approach in conducting the regeneration survey.

Approach and activities

In this study several biotic and abiotic factors that may impact regeneration were measured in the field, along with the amount of viable seedlings. These factors described the forest structure, ground structure, slope, exposure, and disturbance on each plot. The data was collected for 147 systematically dispersed sample plots in the Foriqcho, Durum and Goriaq forest areas. With the analysis of the data material, we hope to determine which of the factors measured most strongly effect seedling regeneration.

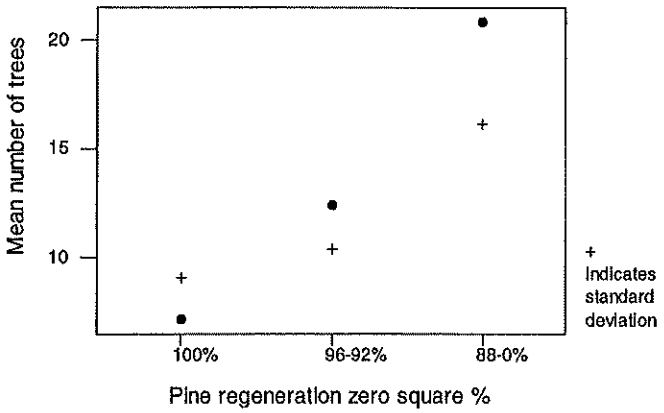
Main findings

The analysis of our data material is not yet completed, however, several clear trends are apparent. Pine regeneration was more abundant in areas with tree cover, despite the fact that *Pinus wallichiana* is considered to be a strong light demander (Troup, 1921). No such pattern was observed for *Juniperus excelsa* regeneration. Seedling distribution was not strongly correlated with ground structure parameters or slope and exposure. However, pine regeneration was positively correlated with the presence of streams. There was also a negative correlation between risk of avalanche and number of seedlings for both species. The intensity of human influence in the form of logging and other activities explained little to none of the variation in seedling regeneration. Animal presence, registered as the amount of dung, may help explain the total lack of pine regeneration in some areas.

An important issue in our further discussion will be the contradiction between the literature and our data material regarding the light requirements of *P. wallichiana*. Trade-off mechanisms, in which the pine seedlings may exhibit a more positive response under lower light conditions in exchange for obtaining greater soil moisture in more shady and protected sites, is a theory that might explain our findings. Further conclusions and recommendations require a more thorough analysis and discussion of our data material; this is still to come.

Figure 8: Graph showing the average number of trees, with standard deviation (+), in three regeneration classes for *P. wallichiana*.

The amount of regeneration is quantified as the percent of zero squares: 100% = no seedlings present in any of the 25 randomly placed 4 m^2 circular plots, 96-92% = seedlings present in one or two of the plots, and 88-0% = seedlings present in 3 or more of the plots.



3: Tree nursery restoration

Specific objectives

The tree nursery was established in Basho by the Forestry Department and later abandoned in 1998. The nursery is ideally located in an easily accessible site near to a reliable water source. Re-establishment of the nursery was initiated with the objective of producing a variety of different tree species and testing their potential use in silvi-culture and reforestation.

Approach and activities

With joint efforts by the Forest Department and AKRSP workers, the nursery infrastructure was restored and seeds broadcast in early June 1999. The seeds came from Gilgit, allegedly from two different provenances of *P. wallichiana* and one of *Cedrus deodara*. However, written specifications about the seed source were not available. The seeds were soaked in water for 24 hours to facilitate sorting and germination. Empty seeds (80-90%) were removed, and the remaining apparently healthy seeds were separated, dried and broadcast in the nursery beds by species and provenance.

Main findings

At the end of June the seeds had still not germinated, most likely due to poor seed quality and/or lack of protective shade and irrigation.

4. Natural forest inventory

Specific objectives

Three forest areas within the Basho valley (Metsik, Fara and Goriaq) were not included in the initial inventory of 1998. To obtain a better stocking estimate Goriaq was measured this year.

Approach and activities

The same procedures used in the initial inventory (NLH-AKRSP, Report No. 4 1998, by Knut Velle) were used for Goriaq, with one additional element; quantification of the number and diameter of tree stumps.

Main findings

The Goriaq forest was found to have an area of 109 ha, with a current growing stock of 3,320 m^3 (mostly blue pine, as well as some birch in the upper belt), which gives an average stocking of 30.5 m^3 per ha. Also in this area, the absence of small trees is remarkable. The mean annual increment of the stem mass has been computed at 1.3%, giving approximately 43 m^3. An important advancement this year was that the local AKRSP staff are currently responsible for completing the forest inventory in the region, reflecting the successful transfer of competence in forest inventory skills to local collaborators, since in 1998 AKRSP did not possess this capability.

5. Wood consumption assessment (model development)

Specific objectives

The extraction levels of wood compared to annual increment was used as an indicator of the sustainability of the current harvesting levels. As data for the annual increment was already available from the initial forest inventory, an estimation of wood consumption (i.e., extraction level) was conducted during this year in order to develop a consumption model for the Basho region.

Approach and activities

The following model for estimating wood consumption was constructed:

T* = A + B + C, *where:*

T = total wood consumption

A = fuelwood consumption

B = timber consumption for house construction

C = miscellaneous wood consumption

**T = f(winter duration, household size, herd size, other preferences)*

Information about wood consumption (i.e., extraction quantities, harvesting patterns, and species preferences) was collected through informal talks with AKRSP personnel, the Forest Department staff and villagers. Factual information on total number and size of households in the eight villages was obtained from local sources. The size of the forest areas and their distance from the eight different villages were recorded. The wood harvesting routes appeared to coincide roughly with the observation that user rights for the various villages occur primarily according to accessibility (cit. Mr. Jawad Ali). Variations in consumption patterns due to season and topographic location of the villages within the watershed were accounted for. Although the figures were compiled from several sources, scientific validation of the estimates was not possible. However, the results could be compared with a consumption study conducted previously in Rupal Valley, Northern Pakistan (Clemens and Nüsser, 1997).

Main findings

Firewood: Heating and cooking are both based on firewood. The house-heating season normally occurs from October to April. The fuelwood is generally collected as dead branches by women, who then carry it on their backs in baskets to the village. Fuelwood harvesting activities are carried out during the entire summer season, with the standard quantity being one to two loads (20-30 kg each) per household per day. The wood is partly used for immediate consumption, while a portion may be stored until winter. Men sometimes assist with firewood collection in late autumn and winter, and usually from the nearest forests.

Some firewood is also collected from home gardens, especially in the lower villages of Basho. Due to lack of quantitative information for the home garden contribution to total wood consumption, the model assumes a linear increase in the amount of wood utilized from home gardens with decreasing elevation within the watershed. This assumption is based on the greater distance from the lower villages to the forest areas. Further, this assumption also agrees with the greater abundance of fruit trees, boundary/border trees, and small woodlots observed in the lower villages. However, a significant confounding factor for the model is that some of the wood produced by the agroforestry systems (especially the highly demanded poplar and apricot) is subject to commercial trading in the markets of Skardu. The effects of wood exports from Basho valley to external markets on the model are unpredictable and therefore were not taken into account. The consumption model and its underlying assumptions may require adjustments in the future to account for the increasing establishment of new agroforestry woodlots with high yielding species (e.g., *Salix tetrasperma*), especially in the upper villages of Sultanabad and Nazimabad.

Timber: Trees extracted from the forest for use in house construction or other timber products are manually harvested using axes and transported (i.e., pushed, pulled and rolled) in trench routes to the nearest road or jeep accessible point. Men are responsible for the logging operations. House construction activities, including restorations, extensions, and new buildings, are currently taking place in all the villages. In order for forest management to be sustainable, the extraction of wood, which also includes the lopping of branches, should not exceed the increment. However, highly intensive pruning activities, as reflected by the abundance of stripped trees having only a small green rosette on top, is resulting in both tree death and significantly reduced growth rates.

Summary: While we stress the preliminary nature of some of the results, an estimated 1,650 tons of wood is consumed annually from the Basho valley forests (Please refer to Appendix 14). The results from the forest inventory gave an annual increment of about 220 m^3 or approximately 200 tons of stemwood. Taking into account the areas not included in the initial inventory (Goriaq, Mesik and Falah) by estimating their contribution to be an additional 100 tons, and the branchwood estimated at 50% of the stemwood, the total current increment will not exceed 500 tons of air dry wood annually. As the consumption resulting from the above preliminary findings and calculations is about

three times higher than the estimated increment, the situation with respect to the sustainability of the forest resources appears to be highly problematic, perhaps even warranting the term "alarming".

3.3.3 Discussion and recommendations

There are three principally different ways of propagating the coniferous forest in Basho: (1) planting, (2) direct sowing, and (3) natural regeneration. However, the three methods complement each other, and each may be appropriate under different circumstances. Adequate seed sources should be identified from local blue pine stands. To facilitate regeneration, native tree species and/or shrubs that colonise well on severely eroded soils and under dry conditions should also be used, serving as nurse trees during the initial stages of succession. Selection of the most appropriate method is to a great extent dependent on the availability of reliable support from the various organisations dealing with forestry in Basho. For example, for planting to be successful, there must be clear ownership rights and allocation of responsibilities for the operation of the tree nursery. Facilitation of natural regeneration processes may be achieved by reducing pressures from human activities through, for example, institutional arrangements, user rights policies, and forest management- and technical arrangements. Political and legislative factors are also important as a basis for encouraging a sound management system. This is a case where the integrated nature of the NLH-AKRSP project can really prove an advantage. The links to pasture management and institutional issues are important, but require more analysis.

In order to ensure adequate natural regeneration, the ecological characteristics and requirements of the dominant tree species must be considered when designing management practices. Since regeneration of *P. wallichiana* most commonly appears under moderate shade and in the form of very small seedlings, additional opening of the canopy is probably required in order to enhance its establishment and growth (Troup, 1921). This may have a beneficial effect by providing shelter during germination and early seedling establishment, while also increasing light availability. Once the young saplings are well established they should be released by removing the overstory canopy. Silvicultural practices that encourage the successful regeneration of *P. Wallichiana*, including thinning treatments and shelterwood and seed-tree methods, should be considered in future management and research plans. Further, the possibilities of using pit-sawing techniques to increase the efficiency of processing timber of larger dimensions in the field, should also be explored in the future.

In contrast to pine, *Juniperus excelsa* requires more specialised conditions to successfully regenerate, such as repeated wet years, and even then this species grows at a very slow pace (Garner and Fisher, 1996). Although there was some regeneration of *J. excelsa* in Basho, seedling numbers were extremely low. The potential for improving the management of *J. excelsa* may be particularly difficult since this species is at the edge of its range, making it highly vulnerable to decline due to exploitation.

As demonstrated by the results obtained from the forestry project thus far, sustainable forest management in the Basho Watershed is highly

complex, involving many integrated and often conflicting factors. These factors are not only related to the biophysical and ecological constraints in the region, but also include many social, economic, and political constraints which require their own mechanisms for reaching workable compromises. However, an important tool that we would like to put forth for consideration in strengthening the local capacity to implement sustainable forest management is the design of a forest management plan. Such a plan could serve as a basis for integrating research results with local experience and needs, as well as providing for an on-going process of information exchange, monitoring and evaluation, and adaptation as new knowledge and experience become available. The development of such a plan for managing the forest resources in the Basho watershed must be carried out by the forest users and their partners and advisors (i.e., AKRSP, the Forestry Department). However, external collaborators (i.e., institutions, researchers, etc.) may play an important function in this process by providing knowledge and tools helpful to developing the management plan, transferring research results into terms that can be incorporated into practical means, and serving as a link between management needs and supporting research activities.

3.3.4 Plans for future work

1. **Transfer of information and skills to local participants (research results, data analysis, data collection).** The preliminary project results will be presented to the local counterparts and a workshop held on data analysis collection and statistical analysis. A central goal is that local counterpart organisations will obtain the knowledge and skills to assume greater responsibility of the on-going research in the field and analysis of the results. An additional component will involve presenting the project results to local people in the communities.

1. **Capacity building in designing a management plan.** The results of this research are intended to contribute to improving local natural resource management and conservation activities. The establishment of a management plan is considered to be an appropriate tool to facilitate this process. A workshop will be held to present the basic concepts of a management plan, and specifically address how the forestry research can be incorporated into the planning process.

1. **Capacity building in local seed collection, storage, and propagation.** An important precondition for good forest management is the supply of viable, native tree seeds. The abundance of cones observed in the forests suggests that Basho may serve as a promising seed source region. Appropriate knowledge is, however, required for the processes of seed collection, storage, treatment and propagation.

1. **On-going research activities.** Data collection and analysis will continue for the identified research priorities within the forestry program:
   - Follow up on data collection for the field experiment using the fenced enclosures that were established in 1998 to assess the impacts of grazing, moisture

availability, and available seed source on natural regeneration.

- Documentation and assessment of the agroforestry systems in the Basho Watershed (i.e., silvopastoral, windbreaks and boundaries, tree-crop interactions), including species planted and their uses, production capacity, local consumption versus export to markets, etc. (including M.Sc. study)
- Research on natural forest regeneration, particularly focusing on micro-site conditions and requirements for successful seedling establishment and growth, and incorporating seedling planting trials of different tree and shrub species produced in the nursery (including M.Sc. study).

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3.4 Farm resources

Mohammad Akbar Raza, Åge Nyborg, Håvard Steinsholt

3.4.1 Objectives

The purpose of this theme is analyse how different groups of households fuse private and common pool resources in livelihood strategies, and major changes that have taken place, or are going on, in this respect.

3.4.2 Approach

Develop a framework for getting an overview of farm resources and how they vary within and between selected villages of the Basho watershed, and carry out preliminary surveys as the basis for further study.

3.4.3 Activities

AKRSP has headed this work. NLH has contributed by broadening the scope of the components addressing institutions, pastures and forestry, although in preliminary ways:

- Initiation of a study on nutrient cycling between alpine pastures, livestock and in-fields (the case of selected households in Sultanabad)
- Preliminary assessment/discussions about agriculture and irrigation management issues in Sultanabad
- Initiation of more rigorous documentation of livestock predation in cooperation with local wildlife guards
- Preliminary assessment of the role of farm-forestry in the watershed
- Preliminary documentation of in-field resources in one village (Bathang)

3.4.4 Implications and follow-up

Private farmlands and other assets represent major resources and constraints for the most important actors in natural resource management: local men and women. Preliminary work in 1999, has brought some qualitative insights which are valuable for the overall analysis of alpine resource management issues.

The work will be followed up by further AKRSP investigations, and, based on AKRSP plan and request, NLH may contribute on selected items that are linked to the main emphasis of the study. In 2000, it is expected that farm forest resources, aspects of land tenure, and livestock and village pasture conditions during winter will get attention.

3.5 Gender, resource management and livelihood security

Ingrid Nyborg, Kulsoom Farman, Gulcheen Aquil, Barbara Gamperl

3.5.1 Objectives

The objectives of this year's work were:

- to follow-up on last year's investigations on differences within the village of Sultanabad, with particular focus on exploring the situation of the poorest
- to investigate more closely how women and men utilise the forest, with particular emphasis on intra-village mechanisms
- to integrate this component's activities with complementary research activities on health, food and diet going on in Basho

3.5.2 Approach

In broad terms, this component uses a qualitative, social science approach to study the interdisciplinary issues of gender, natural resource management and food security. Further, a case study approach has been chosen in order to best explore the complicated social networks involved in determining how women and men gain access to and manage their natural resources. The methods include interviews and discussions with village women and men, and key informants both inside and outside the village, the use of participatory learning techniques, and participant observation.

3.5.3 Activities

Fieldwork: While in the field this summer, group and individual interviews were conducted with women and men in Sultanabad, and with the members of the BDO. There were also discussions with the other researchers doing their field research, as well as with the AKRSP staff involved in studies in Basho. Positive interaction in the field was also achieved through discussions and joint meetings with Barbara Gamperl, hired as a consultant for AKRSP to look at food science and nutrition aspects of food security in Basho.

A second period of field inquiry is currently going on (fall and winter '99, and spring '00), where Gulcheen Aqil is conducting a comparative study of one of the villages farther down the valley. Studies in other areas where AKRSP is working will also be initiated during the winter and spring months.

Workshops: two workshops were held at the AKRSP regional office in Skardu. The first

workshop was with women staff of AKRSP. The purpose of this all-day workshop was to share some of the issues and findings of the work in Basho with the regular female staff, who have until now not been directly involved in the research program. The workshop was organised into four broad themes (health, poverty, food/diet and control over resources), under which the researchers (Ingrid Nyborg, Gulcheen Aqil and Barbara Gamperl) presented their findings. Under each theme, AKRSP staff were asked to discuss these findings in relation to their own experiences and studies they have conducted under AKRSP's Training and Learning Program (TLP).

The second workshop was open to all AKRSP staff, and was held together with the Pasture and Biodiversity, and Farm Resources components. This component presented preliminary finding from this year, as well as a report on Food and Health in Basho which was based on last year's fieldwork, and preliminary findings on food science and health by Barbara Gamperl.

3.5.4 Main Findings

The data both from last year's and this year's fieldwork is still being integrated and analysed, so the degree to which one can present findings at this stage is very limited. Nevertheless, some of the issues which have been explored more in depth this year can be summarised as follows:

Negotiation as a Continuous Process

Both women and men are involved in negotiations over the control of resources. This is the case not only where rights are poorly defined, but also where there are rules and regulations explicitly defining the use and ownership of resources, such as inheritance laws or laws governing the use of the forest.

Differentiated mechanisms of negotiation for resources

Negotiation for resources is most visible where disputes are negotiated in formal fora involving, for example, the BDO, the government, village elders and religious leaders (see Steinsholt et al. 1998:27 for an overview of the formal processes of negotiation). There are also, however, informal fora where both men and women negotiate control over resources. However, the strategy one chooses and the degree of success one enjoys in negotiating resources depend on one's relative power in the community - something which is highly contextual and can thus change over time and with varying circumstance. This year's research has explored more closely the strategies and options available to different women and men in the village, both as gendered individuals as members of poor households. It is clear that the poorer households and women have difficulties in negotiating resources in the face of powerful neighbours and authorities, and that the prospects of increased access to resources through contact with AKRSP represented a potential new source of power for those disadvantaged in the existing system.

Social Networks as Sources of Allies and Power in Negotiations

The women and men of Sultanabad are members in various networks through which they can recruit allies and gain support in their claims over resources. The membership in various networks allows for the shifting of allies depending on the prevailing situation, giving a

flexibility which is not apparent when defining negotiating power in one particular case or point in time. Some of the networks being explored in this study are food/gift exchanges, agricultural labour exchange, firewood collection, shared animal ownership, and rotation-systems for herding.

Links Between Resource Management, Health and Education

The study has thus far confirmed the assumption that resource management activities are closely linked to the issues of health and education. Both women and men suffer directly from labour-related illnesses - heavy workloads and poor working conditions. Literacy in the village is extremely low - only a handful of men can read or write, and none of the women. This negatively affects their livelihood options (in obtaining jobs other than manual labour) by limiting the extent to which they can diversify their income base through off-farm income.

3.5.5 Current status

The current status of this component is as follows:

- PhD field research has been completed.
- AKRSP's research assistant is continuing fieldwork and writing results on a comparative study farther down the Basho valley.

3.5.6 Implications/Suggestions for Further Work

With the bulk of the research of the PhD study in Sultanabad completed, and a comparative study of a village down the valley in progress, it is suggested that further work in this component be comprised of two parts:

Follow-up on work in Basho: This would begin with a follow-up of the issues currently being addressed in Sultanabad. Since the study of gendered negotiations of resources is concerned with changes over time, this is an opportunity to further explore changes in control over resources, and likewise changes in women and men's livelihood strategies over time. While some studies are interested in longer trends, this study would give insight to the continuous nature of negotiation over resources. In addition, as the pieces in the other project components are falling into place, there is an increasing opportunity for integration between components. Further follow-up in Basho would also involve comparative work in villages farther down the valley. This would entail interviews with villagers together with AKRSP's research assistant, offering her support in both field methodology and report writing.

Comparative study in another valley: A comparative study in another valley of Baltistan would allow the project to 'test' its ideas in another area, to explore the degrees of diversity and comparability of the different issues addressed in Basho. It would also allow AKRSP staff from the FMUs to become involved in the project more actively. At the workshop for the women staff it was suggested that for the 2000 season:

- A site at the top of another valley be chosen
- The women staff working in that area (or other areas!), together with the project's research assistant, initiate a study in the new village under the guidance of the component counterparts
- The NLH researcher visits the site together with the women staff to supervise in-depth

discussions with villagers, giving methodological and conceptual support if necessary

Concerning the choice of village and valley, alternatives could be suggested by AKRSP project staff counterparts, and decided on in consultation with the NLH researchers. The criteria might include: similarity or difference with Basho in terms of resources, the interest of other components.

3.6 Information and documentation

3.6.1 Introduction

Information resource management is central for an international, interdisciplinary research project and for AKRSP activities more generally. In 1998 a foundation was made for collecting and registering project relevant documents, and a simple WWW site was created to disseminate information about the project as well as collecting links to other material relevant for project participants. Contact with AKRSP Baltistan at that time mainly took place through correspondence and sending database prints at regular intervals.

3.6.2 Objectives

The main objectives mentioned in the Activity Plan for 1999 were:

- To continue the activities started in 1998
- To facilitate increased exchange of information between project counterparts in Baltistan and Norway.
- To strengthen the support of AKRSP Baltistan's efforts in networking for information access.

3.6.3 Main activities and achievements

This sub-chapter is structured according to the objectives mentioned above.

1: To continue the activities started in 1998

Special collection and database development

Both the actual collection of documents registered in *BIBSYS* and the number of references registered in *ProCite* have more or less doubled. However, a small error in *BIBSYS* export format has hampered smooth import of *BIBSYS* data to *ProCite*. Therefore the two databases have not yet been integrated, and searching the databases becomes a bit more time consuming this way. However, *BIBSYS* is preparing a special module for analytical records integrated in the total database, and in the long run one must consider whether using this module will be a better option than using *ProCite*. One will in any case continue pushing for the *BIBSYS* export programme to be corrected, since *ProCite* will still be the joint medium for reference exchange between AKRSP Baltistan and Noragric libraries.

WWW pages

Due to a total reorganisation of Noragric's WWW site, the pages on this project were inaccessible for several months, but reappeared with a new URL in June 1999. The new URL is: http://www.nlh.no/noragric/Projects/akrsp/default.htm

Towards the end of the year, the 1998 Reports were mounted on the WWW in pdf-format, and the page of links to relevant information sources was updated. Although AKRSP Baltistan cannot access this information, the pages have

brought them some useful contacts and must be seen as an important aspect of international networking aspect.

Directory of networks etc. for information access

No new addresses have been added to the *FileMaker* database on networks etc., but several addresses have been passed on to AKRSP Baltistan in print. Mainly due to a change in counterparts, no specific efforts had been done to follow up the networking aspect in October 1999, when the Noragric librarian visited Skardu. However, the idea of networking is supported by AKRSP staff, also others than counterparts to this specific project. A sample letter for requesting newsletters and other publications was developed, and initiation of networking efforts was agreed upon. One should note that several AKRSP staff are already members/participants/subscribers to networks like *Forests, Trees and People Programme*, ICIMOD etc.

2: Facilitate increased exchange of information between project counterparts in Baltistan and Norway.

During the field season of 1999 a set of relevant articles was brought from Noragric for AKRSP counterparts. A set of photos documenting various research components was also shared. The photos have been produced as slide sets and on CD-ROM, and both formats are available both with AKRSP Baltistan and with Noragric to be used for presentations etc.

Norwegian project partners have been assisted in information and literature retrieval. But, since there was some doubt as to whether the link between counterparts have been functioning well enough, a new agreement for information access was approved when the Noragric librarian visited Skardu in October 1999. AKRSP staff linked to the HAINRM project may now approach the Noragric library directly to request assistance in literature search and document access. Literature requests, mainly based on references from Noragric's already established collections and databases was taken to Norway for handling. Ideally the documents should be deposited in the AKRSP library after use.

3: To strengthen the support of AKRSP Baltistan's efforts in networking for information access.

As already mentioned, new efforts have been made to assist a more systematic approach to the use of information networks etc. for establishing a continuous flow of easy-to-manage documents for professional input and inspiration to AKRSP staff. The establishment of a small library/information service, and the presence of project information on the WWW must also be seen in a networking context.

4: Other activities.

Gilgit NRM Workshop

In May 1999 AKRSP Core Office arranged a workshop was in Gilgit between various organisations doing research and/or development work on agriculture and NRM in the Northern Areas of Pakistan. Mutual exchange of documents was discussed, and WWF Pakistan, Regional Office Northern

Areas, Gilgit volunteered to function as a focal point for information and documentation on projects run by these organisations in the Northern Areas.

Library and information service at AKRSP Baltistan

AKRSP Baltistan is in the process of setting up a small library/information service to cater not only for the information needs of AKRSP staff, but which will also be a library open to the many visitors to AKRSP: researchers, students, representatives from donor organisations, tourists etc. This has been encouraged and supported by the HAINRM research co-operation with NLH. Staff and premises have been allocated, documents collected from individual staff's offices for a more systematic management.

During October 1999 the Noragric librarian, Liv Ellingsen, spent 10 days in Skardu to assist and advise Mr Mohammad Yousuf, in charge of the AKRSP Baltistan library, in establishing routines and plans for managing the library. A separate report with recommendations regarding the running of the library was prepared.

About forty book titles have been provided by project funds for the AKRSP library up to November 1999, and more are being ordered according to references requested by AKRSP staff.

Although the library/information centre must be seen as having an identity separated from the HAINRM project, it is the hope that the focus put on information and documentation in this project will also be an important stepping stone for the ongoing efforts to establish a library and information service for agriculture and natural resource management in Baltistan - as far as we know the first one ever.

3.6.4 Conclusion

The information and documentation component of the HAINRM project may so far have been of more direct utility to the Norwegian partners than to their Baltistan counterparts. However, through improved contact and exchange of bibliographical data, and the support given to the AKRSP Baltistan library, we believe that AKRSP will in future reap increasing benefits from the foundations laid during the first two years of the project.

4. DEGREE TO WHICH OBJECTIVES HAVE BEEN MET

4.1 Overall aim and main thrust 1999

Entering a three years phase has opened new opportunities and challenges for the partners. We get the chance to take a longer perspective on both research and competence building. This is clearly an advantage, for instance in some of the monitoring work that has been to understand the dynamics of vegetation change. It has also enabled partners to launch some more long term competence-building efforts, such as applying for a PhD programme for an AKRSP staff.

The 1999 Activity Plan suggested as the main thrust in 1999:

Continuation of joint applied field research; strengthened focus on competence building and dissemination through local training and learning workshops and local presentation of

findings); preparation, discussion and initiation of applied research experiments (e.g. experiments with regeneration of pasture plots, rejuvenation of natural forest); supporting information management at AKRSP -Baltistan.

The partners find that the activities and results obtained correspond well with the overall aim, the institution-specific objectives of the programme (sub-chapter 1.1) and the main thrust outlined for 1999. This is further substantiated below.

Weaknesses that may deserve more attention are:

- Communication outside the periods of working together in the field or in Skardu is difficult, both technically and in terms of the extra human effort it requires. This hampers joint analysis and planning. There is continuously a need to strengthen the human and intellectual integration of a complex project. This year, we only realised to a limited extent the potential for integrated analysis of findings and their policy and practical implications for NRM. Due to the communication problem when teams are not together, we have to pay serious attention to this during future joint sessions in Pakistan and Norway.
- NLH introduced some new staff members in 1999. This broadened the professional expertise, but also lead to some repetition of efforts.

4.2 Goals achievement 1999

The project document and activity plan for 1999 outlined some more specific goals, which are discussed in the following.

Consolidating the institutional relationship and contact with villagers for a participatory project relevant to local people's concerns

AKRSP and NLH have developed the institutional relationship resulting in a better understanding of resources and constraints in either institution. Counterparts responsible for sub-components have established individual relationships; it is a continuous challenge to look for the appropriate learning processes and activities that reflect common ownership of the project and its outputs.

The partners have continued to have a good working relationship with villagers and their representatives in the BDO, but through a process which was not without its hurdles, as reported in 1998. This year there were specific questions raised about the experimental research involving fencing of plots (linked to a suspicion, particularly from lower-watershed villages that fencing was linked to a AKRSP-NLH-upper-village plot to take over parts of the commons!). Such scepticism is understandable in the kind of society we are working. The tension was adequately handled and resolved by the BDO. Meetings, plus actually seeing the small size of the different plots, also helped (of course only time will show whether the support lasts through the winter and coming field seasons).

The success in implementing the project is primarily based on AKRSP's history and recognition in Basho. AKRSP, through its social organiser and other staff, continued to make a big effort in facilitating and explaining the projects and in solving emerging conflicts. It was of considerable importance that AKRSP

had agreed to support the construction of a guest house, a project identified by the BDO with broad community support[10]. Several Norwegian researchers also had a good experience of "coming back". The continuity of the involvement was the basis for closer relationships and deeper understanding of issues (e.g. in the case of understanding poverty issues in the work on gender, resource management and livelihood security). Staff continued to experience good, informal relations with local people; yet when it comes to controversial issues, such as forest utilisation, Norwegian participants have to recognise the considerable constraint of relatively short field periods, and the quality of relations and information they entail.

In line with the recommendation from the 1998 Summary report[11], participatory learning was mainly with individuals or small focus groups this year. However, general meetings were held at the beginning and end of the main field research period in May-June.

There is still a need to renew and re-confirm local interest and BDO support through discussion of methods, findings future activities. "Products" appreciated by local people should also get more attention[12].

[10] Although, again, with some lower-upper watershed disagreement.

[11] "Because other organisations have also carried out participatory research in Basho (IUCN, March 1998), further research should be very clearly targeted and probably carried out with smaller focal groups."

[12] An idea may be to follow up BDO concern about presenting Basho by working together on a popular presentation of the project/project area/main issue, with illustrations and professional lay-out.

Based on the overview and findings from 1998, pursue the main issue of the role of alpine resources in local livelihood strategies, through more focused and in-depth investigation and competence-building

This goal was followed up in all components of the project (ref. separate chapters), but a few key points may be listed:

- More emphasis on rights and use of alpine pastures through focusing at selected "systems" (Ruskin lower and upper broqs), and through more detailed recording of people/livestock migration patterns
- Initiation of ecological experiments in natural forests and alpine pastures
- Improving mapping and expanding the inventory of natural forest
- Initiating work on modelling natural forest production and off-take
- Further documentation of local differentiation of local use of different parts of the natural forest
- A better understanding of local community dynamics how they shape resource competition and co-operation

Here, as in general, the main learning and competence-building approach is working together in the field on these issue (but see also separate point below).

Strengthening the integrated perspective by incorporating work on farm resources and pursuing the issues of below the channel forest and fodder production more than was possible in 1998

Plans and discussions have stressed the limited resources that NLH have had to enter the "farm resources", added to the list of project

components after the 1998 field season. Nevertheless, some considerable steps were made by AKRSP alone or AKRSP and NLH in cooperation. The co-operation included:

- Initiation of a study on nutrient cycling between alpine pastures, livestock and in-fields (the case of selected households in Sultanabad)
- Preliminary assessment/discussions about agriculture and irrigation management issues in Sultanabad
- Initiation of more rigorous documentation of livestock predation in cooperation with local wildlife guards
- Preliminary assessment of the role of farm-forestry in the watershed
- Preliminary documentation of in-field resources in one village (Bathang)

Important issues have come up and been discussed by AKRSP-NLH counterparts and villagers. New linkages have been identified, adding to our understanding of the complexity and integration of "above" and "below"; in many ways they may lead us towards down-playing this distinction. While addressing farm resources is important for the "ideal" (holistic) approach to watershed management and resource development, thorough participation by NLH is seriously constrained by budget limitations and already made commitments within the project. Agronomic studies will probably have to remain outside the purview of the present phase of the cooperation project.

Initiate the process of expanding the geographical scope of the project by discussing results with more Baltistan FMUs and cluster organisations, and by making the first steps towards comparing the Basho case with one or two other watersheds (information sharing between cluster organisations)

The "institutions team" (Raza, Steinsholt, Wisborg) visited Khaplu and had good discussions with Sayed Ali, FMU Manager, and M. Ibrahim, Social Organisor there. The brief comparison of Basho with one section of the alpine resource system above Khaplu demonstrated some of the considerable regional variation which local people, cluster organisations and AKRSP are facing. Proper comparative studies are an interesting option, and could perhaps be pursued through supervised studies by AKRSP staff, whether in Baltistan or other regions of the Northern Areas. There is also a need to draw upon the already existing body of studies and work on watersheds and cluster organisations available with AKRSP (e.g. through use of the Gilgit library).

Workshops with AKRSP staff in Skardu have also been a way to draw upon experiences from elsewhere. Under the "gender-component", the counterparts have discussed and tentatively planned comparative studies by female staff of AKRSP-B. Good cross-regional links within AKRSP (through the NRM Forum) facilitates sharing and comparison, but as a channel for dissemination of project findings it has yet to be used. Contact with the Gilgit-based European Union funded *Agrikarakorum* project (mentioned below) is one of the best ways to convey and assess findings in a broader geographical perspective.

Focus more on competence-building for AKRSP staff through an NRM workshop (immediately following the main field research

period), using the Basho case to discuss issues with staff from larger area

Several thematic workshops were held in Skardu, with good participation and discussions.

- ***More emphasis on counterpart cooperation in planning, analysis and write-up, e.g. supervised contributions towards national level workshop***

Interaction in planning and execution of research has generally been good, although still uneven (regarding the work on biodiversity it has been a problem that AKRSP has not got a counterpart with special education in and responsibility for this field; however, the direct co-operation with local people with special knowledge and skills regarding wildlife has been good).

In 1999, AKRSP staff have produced independent work linked to the project:

- Jawad Ali: *Saving th Llast Juniper : the role of community institutions in forest management : a case study from Basho valley, Skardu, Baltistan.*- Skardu : Aga Khan Rural Support Programme, 1999. III, 32 s.
- Gulcheen Aquil: *Health and Food in Basho*, Skardu: Aga Khan Rural Support Programme, 1999, 21 p

Joint analysis and write-up after the partners have split up is generally still problematic (one of the justifications for placing somewhat less emphasis on "reporting"). Co-operation on the preparation for workshops in 2000 is a challenge for next year's work.

- ***Explore possibilities for higher degree training for AKRSP***

One AKRSP-B staff has applied for a PhD scholarship announced by Noragric (the wording particularly targeted towards important concerns in the cooperation project). The NLH admission committee approved the application in December 1999. While the NORAD scholarship programme is currently not available to students from Pakistan, it should be stressed that the scholarship programme form the Norwegian Loan Fund for Education (*Lånekassen*) still is.

Continue the information and documentation component with increased emphasis on making information resources available to AKRSP-B

Under AKRSP-B leadership a small library has been established in the AKRSP-B office in Skardu, the first in the region with a development and natural resource management focus. A reported elsewhere, NLH project support to the library has been stepped up through increased supply of literature and through the visit and training by Liv Ellingsen, Librarian at Noragric, in October 1999.

Further develop coordination with other important development agents in Basho, particularly Forest Department and IUCN, and increase regional/ national-level communication on themes and findings through participation in joint workshops.

As noted last year, there are several institutions directly involved in management or management related research in Basho, notably Forest Department, AKRSP, IUCN and NLH.

In 1999, regional awareness, and to some extent co-operation, was greatly facilitated by the "*Workshop on NRM Issues*" in Gilgit, May 23-24, in which several regional, national and international organisations participated. The project was represented by seven staff from AKRSP and six NLH staff. Poul Wisborg presented the project and some 1998 findings.

It is important that we stay in contact and exchange information with the EU Agri-Karakorum project (involving AKRSP Core Office, Macaulay Land Use Research Institute, Scotland, and other Pakistani and European partners). Participation by NLH (Wisborg and Seim) in an exchange and planning workshop in Aberdeen 4 - 7 October 1999 contributed to this. In 2000, it is important that AKRSP-B is well-represented in the EU-Karakorum workshop in Gilgit, planned for approx. 6 -7 November 2000. We have also agreed to exchange more detailed information about field research, in order to be able to make mutual visits to the project areas (In 1999, both projects benefited from the visit of Jürgen Clemens and Raja Omer, EU Agrikarakorum, project to Basho).

In 1999, the BDO became party to the "*Forest & Wildlife Conservation Plan for Basho Valley Community Conservation Area, District Skardu*", Basho Village Conservation Committees, February 1999 (under the IUCN Biodiversity Conservation Project). It is a possible framework and guidance for the BDO and conservation committees at a more decentralised level. As such it also complements the AKRSP-NLH project, which focuses primarily on learning and understanding, with limited management action. While some of the AKRSP-NLP findings are utilised and referred to (particularly the forest inventory), NLH was not involved in the process of formulating the document.

AKRSP and NLH continued linking with the Forest Department in the forest related studies and with IUCN concerning the work on wildlife. Yet, in practical terms the co-operation with FD seemed more restricted in 1999.

Explore and determine specific competence building activities for AKRSP staff, such as short courses in Pakistan or Norway

- AKRSP was provided with information on English language **short-courses** at NLH (but the current budget for the linkage programme is a constraint)
- **NLH visit and field workshop in Norway 2000.** The partners have planned a visit for key AKRSP staff to NLH and selected institutions working on alpine resource management in Norway.

Several counterpart meetings were held during the field season, both in Skardu and Basho, for preparing work and discussing findings. Mini-seminars were held on:

- June 6: Pasture, forest and wildlife
- June 7: Institutional issues, Khaplu
- June 10: Institutional issues, Skardu
- July: Two workshops on gender, linked with farm resource and pasture issues

Reporting by NLH/AKRSP

In 1998, partners produced Reports 1 to 7, covering each of the sub-themes addressed. We found that "*it is perhaps fair to say that NLH dominated reporting has received too much*

attention as compared to other learning and information sharing strategies" (Report No. 1, 1998). Partly in response to this, we decided to go for one joint *Progress Report 1999* as a more manageable output; that report would then be able to direct readers to other products, even though some of those would be only in the pipeline. Brief but substantive field reports produced on the spot are also useful and important.

NLH researchers held two one-day workshops (on September 15 and 22) for professional discussion and planning. This is useful, but in discussions about integration, policy and strategic implications and further follow-up, the direct interaction with counterparts is necessary. An AKRSP visit to Norway i 2000 should be used for this purpose too.

5. LESSONS LEARNED

AKRSP and NLH have consolidated their institutional cooperation programme, and begun to produce noticeable results. These are some of the lessons learned in 1999:

1. Relevance of focus and case: The second year of study, too, has confirmed the relevance of the focus on alpine resources, and Basho is well selected to illustrate the importance and complexity of the issues studied. In 1999, we found that some issues (e. g. local forest use and seasonal transhumant movement patterns) are even more complex than anticipated. Basho is still "challenging" for the partners.

The partners have not explicitly pursued the implications of the study for NRM strategy in Baltistan, or more broadly.

2. Learning process: The partners still have some way to go to realise the full potential for joint learning. The challenge (noted in 1998) of specifying **the mode and goals of the learning process**, the respective roles and responsibilities of AKRSP and NLH staff, and how they mutually support each other - is still with us. Where we have moved ahead is strengthened cooperation and field level involvement on the Pasture and livestock component; individual studies by AKRSP staff; more lively and focused workshops, reflecting, perhaps, greater trust between the partners.

3. Funding arrangement for institutional cooperation: The partners entered a three years co-operation period, 1999 - 2001, based on AKRSP-Baltistan NRM proposal and application to Norad. According to the proposal 4.0 mill NOK would be allocated to the cooperation project. After the application was approved, the partners agreed on a budget in which the majority (about 3.5 mill.) is used for the NLH participation (in harmony with Norad advice). Funds are set aside to cover actual AKRSP direct implementation cost (though not staff time use). It was agreed in 1999, that AKRSP-B should get its compensation directly from AKF, with reference to the budget line for the institutional cooperation. AKRSP must therefore prioritise the investment required for active participation in different stages of the project, and obviously it has its "opportunity costs" during a very busy season of NRM implementation.

The funding arrangement and mode of compensation to NLH through the Aga Khan Foundation has worked smoothly.

4. Logistics and administration: The project is complex with a high number of people involved, as compared to the overall size of the project. Both partners found in 1998 that logistics and administration turned out to be more of a burden than expected. In 1999, some practical aspects were made easier by the fact that the initial investments and arrangements at the Basho field site had been made. It also helped that most visits/field research were better coordinated, with concentration in on period in May-June. The administrative and logistical challenge is still an important point in planning.

5. Focus, complexity and flexibility: Today, the project has the basis for achieving continuity with respect to the major issues of resource management in the high-alpine zone. Budget constraints, and practical experiences, that partners must maintain a clear focus on major issues of pasture and forest management.

The analysis of linkages/integration needs more attention, through cooperation across the different components.

Private farm resources "below the channel" are important to understand livelihood strategies within an integrated livelihood and production system approach. Fodder production, farm forestry and food security are key issues. Due to funding constraints (and the problem of escalating complexity), NLH direct contribution will remain modest (but ref. the previous reported work addressing this).

7. Other partners: As stated in AKRSP policy, broader institutional co-operation is necessary in management of alpine commons. The cooperation with the Forest Department about the natural forest inventory was successful and practice oriented in 1998, but diminished in 1999. In 2000, a concrete focal point for coordination/discussion with Forest Department, IUCN and the Basho Development organisation, may be to review the progress of the IUCN led process with implementing a *Forest and Wildlife Conservation Plan.*

6. FURTHER WORK: RECOMMENDATIONS

Some of the general recommendations suggested last year are still relevant guidelines for the project, and are supplemented here with only a few more specific comments and suggestions (please refer to the thematic sections and the Activity Plan 2000, to be finalised in the beginning of 2000).

1. AKRSP - NLH co-operation project should be continued within the framework of the aims, goals and scope formulated in the project document of 1997; the agreement signed by the two institutions; and the application to NORAD (AKRSP, 1998). Through the current three-year programme 1999 - 2001, the partners should have achieved:

- AKRSP-Baltistan has substantially strengthened its competence for integrated NRM
- AKRSP and NLH have developed a joint, problem-based learning approach
- The project has contributed to AKRSP's strategy for integration of the high alpine zone and wider environmental concerns in programme planning

- Articles of international scientific standard have been published

After the work in 1999, we believe that we have moved along safely on the first two bullet points (developing competence and approach). The last two (analysing strategy implications; publication) have not yet been achieved.

3. Partners have created a foundation for a unique study of a mountain valley undergoing rapid change, and the effects the change has on peoples strategies for managing natural resources. This shared perspective must be maintained, so that the AKRSP - NLH case study becomes increasingly relevant for documenting and understanding broad processes of change in the region.

4. The project leaders and each of the counterpart teams must pay careful attention to planning, not only of the issues of study, but the learning process and its specific goals and outputs in terms of competence-building. The new round of field research and training must therefore be initiated with planning sessions where shared understanding of problems and goals are consolidated and refined.

5. Broader comparison and information sharing with other Field Management Units and Regional Programme Offices should be strengthened.

6. The strategic implications of the project should be discussed and identified, with a view to discussing and drawing lessons regarding AKRSP Baltistan's implementation of the NRM strategy.

APPENDIX 1: OVERVIEW OF MAIN ACTIVITIES AND PARTICIPANTS 1999

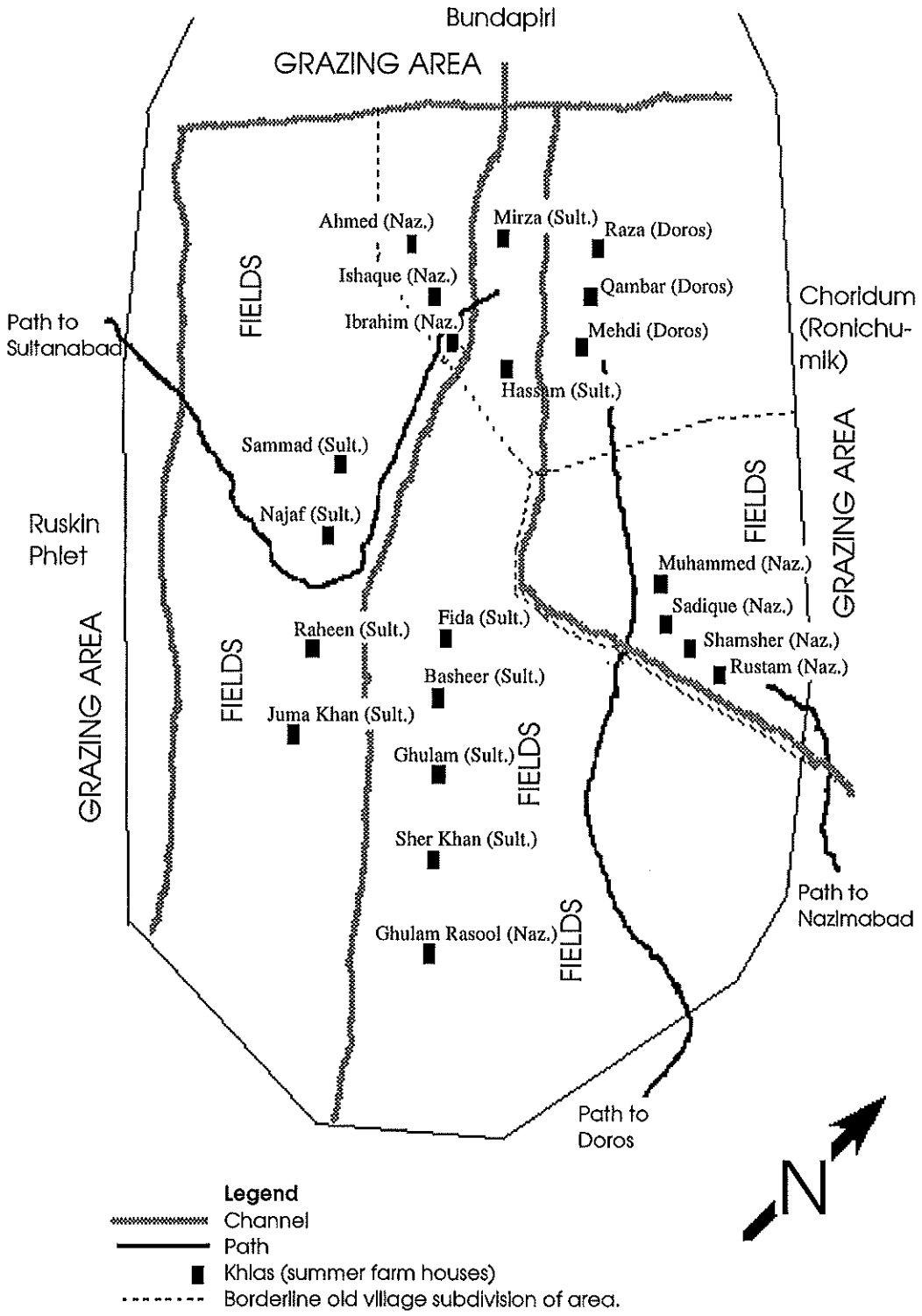
TIME	ACTIVITY/OUTPUT	PARTICIPANTS
January - March	**Details of project preparation.** A number of meetings held. Plans for field visits. Correspondence. Literature collection.	Staff on both sides
22.-23.5.	**Workshop on NRM Issues**, arranged by AKRSP Gilgit	Staff on both sides
May - August	**Field implementation (general)** Main points given by sub-component below.	AKRSP - NLH counterparts. Dr Abbas, Field Coordinator W.. Shabir, Field Coordinator Ghulam Abas, Field assistant Muhammad Diin, Field assistant Mr Ashraf, Field assistant
24.05. – 14.06.	**Field research, *Institutions and organisations***. Dynamics of institutions, rights and use of forest and pastures. Workshop in Skardu 07.06. Workshop in Khaplu 10.06. Field visit Khaplu cluster broq. Field report 09.06	Moh. Akbar Raza, Coord./Res. Håvard Steinsholt, Res. Hans Sevatdal, Advisor Poul Wisborg, Cord./Res.
25.5. – 20.07.	**Field research** *Pasture, livestock and biodiversity* • vegetation sampling • enclosure experiment (impact of grazing/Trampling) • livestock productivity • (foraging behaviour) • soil fertility assessment pastures • ibex census	Dr Afzal; Øystein Holand; Per Wegge; Jawad Ali, Veronika Seim; Åge Nyborg; Mats Finne, Dr Abbas
May - June	**Field research *Farm forestry and natural forest*** • experiment with natural regeneration • natural forest nursery assessment • overview of plantation forestry • eco-system dynamics and local knowledge • MSc project on factors affecting natural regeneration	Jawad Ali; Wazir Shabir; Knut Velle; Heidi Asbjørnsen; Jakob Thompson (MSc), Snorre Synnestvedt (MSc) Mr Sharif, DFO, Skardu; Local people
May/June/July	**Field research *Farm resources*** • case study of nutrient cycling (pasture - farm - livestock) • case study: village resource map/tenure	Moh. Akbar Raza; Åge Nyborg; Mohammad Ali, Håvard Steinsholt
July- August	**Field research *Gender, resource management and livelihood security*** PhD field research. Integrate gender awareness in project components. A number of workshops at Skardu.	Ingrid Nyborg, PhD res.; Kulsoom Farman, Gulcheen Aqil, Barbara Gamperl
Throughout the year	**Information and documentation** Development of documentation centre/library at AKRSP Baltistan. Collection of literature; expanding of databases; institutional networking references. Shared at/after Gilgit workshop. ; publication at WWW site; Liv Ellingsen visit to Skardu/Gilgit 05.-24.10.	M. Yousuf; Nazir Ahmad; Liv Ellingsen. M. Maqsood Khan
Throughout the year	**Co-ordination** Travel/Field visit, PW, 19.05.-14.06.; reporting August - October , preparation of activity plan 2000 (June – Dec.). NLH workshop days for joint writing and planning 15.09. and 22.09. Steering Committee Meeting Nov.	Mohammad Akbar Raza and Poul Wisborg (Team leaders AKRSP/NLH)

APPENDIX 2: OVERVIEW OF NLH VISITORS TO AKRSP BALTISTAN AS PART OF INSTITUTIONAL COOPERATION 1999

Project	NLH - visitors	Time (gross travel)	Comments
Institutions	Håvard Steinsholt	19.5.- 14.6.	Main researcher
Pasture, livestock and biodiversity	Veronika Seim	19.05. - 15.07.	Research Assistant (pasture/livestock)
	Øystein Holand	19.05. - 07.06.	Main researcher (pasture/livestock)
	Aage Nyborg	23.06. - 05.08.	Researcher (soils)
	Mats Finne	19.05. - 07.06. 23.11. - 10.12.	Researcher (wildlife)
Forestry	Knut Velle	19.05. - 07.06	Natural forest regen. study
	Snorre J. Synnestvedt	Approx. 25.04.. - 20.07.	M.Sc student, NLH
	Jakob Thompson	Approx. 25.04.. - 20.07.	M.Sc student, NLH
	Heidi Asbjørnsen		Researcher/supervisor
Gender	Ingrid Nyborg	Approx. 23.06. - 05.08.	PhD Researcher
	Morgan Nyborg (6)	Approx. 23.06. - 05.08.	Accompanying child
	Kimberly Nyborg (3)	Approx. 23.06. - 05.08.	Accompanying child
Information	Liv Ellingsen	05.10. - 21.10.	Librarian
Coordination	Poul Wisborg	19.05. - 14.06.	Coordinator/Researcher

APPENDIX 3: SKETCH OF RUSKIN LOWER BROQ

Source: Prepared by villagers from Sultanabad/Nazimabad 25.5. and 26.5.1999, together with Veronika Seim and Øystein Holand.



APPENDIX 4: OWNERS AT RUSKIN LOWER BROQ AND CATEGORIES OF KHLASES

Table: Four owners at Ruskin Broq.

Name	Village	Cult. land	Meadow	Plots	Comment
Abbas	Doros	8 kanals	some	30-40	Terraces on one consolidated area
Ashraf	Nazimabad	8-9 kanals	some	6	Consoldidated area of former Bundopa-clan land
G. Rasool	Nazimabad	8 kanals	some	1	Consolidated area purchased from Sultanabad man
Abadi	Nazimabad	20 kanals	4 kanals	10	Plots spread out - problems by managing irrigation system.

Table: Categories of *khlas'es* (preliminary)

Khlas type	**Right holders**	**Use**	**Age**
Khlas at cultivated broq (eks.: Ruskin)	Household	Entitled household and companions.	"Old"
Khlas at lower uncultivated broq (eks.: Soq)	One or more households or villages	Right holder to *khlas* or permitted others	"Old"
Khlas above lower broq (eks.: Bondipiri)	Group of entitled households to lower broq	Group of entitled households to lower broq and companions	Often recently established
Upper valley *khlas* (eks.: Chalabat)	Village or groups within village	Recessive use for all. Customary use by village or household	Quite recently established

APPENDIX 5: MATRIX OF CURRENT FOREST USE BY VILLAGES IN BASHO

Group	Village Forest area	Matillo	Bathang	Khar	Guncho	Meito	Doros	Nazimabad	Sultanabad
!	Metsik	G-F-S							
	Fara	G-F-S							
	Kiltar	G-F	G-F	G-F					
	Nilo	G-F							
	Tamchan	G	G-F						
	Bolom		G-F-S	G					
2	Goriaq and Emeil - south-west slope		G-F-S	G-F-S	G-F-S		G-F	G-F	G-F
3	Foroqcho		G	G-F	G-F-S	G-F	G-F	G-F	G
	Korkorbina Shalma		G	G-F	G-F	G-F-S	G-F	G-F	G-F
	Durom		G-S	G-F-S	G-F-S	G-F	G-F	G-F	G-F
	Ranga		G	G-F	G-F	G-F	G-F	G-F	G-F
	Tanmosa		G	G-F	G-F-S	G-F	G-F	G-F	G-F
	Sonpochomik Shalma		G	G-F	G-F	G-F	G-F	G-F	G-F
	Natachin		G	G-F	G-F	G-F	G-F	G-F	G-F
	Siachan		G	G-F	G-F-S	G-F	G-F	G-F	G-F
	Chat		G	G	G	G-F	G-F	G-F	G-F
	Zigerkun		G	G	G	G	G	G	G-F
	Shanes		G	G	G	G	G	G	G
	Charimond		G	G	G	G	G	G	G-F-S
4	Sari					G-F-S	G-F-S	G-F-S	G-F-S
	Astani Shalma					G	G-F	G-F	G-F
	Lazang Ganicho Raymil, Bitay					G-F-S	G G-F-S G-F-S	G	G G-F-S G-F-S G-F-S

G: Grazing F: Forest products (firewood, minor forest products) S: Stay rights (khlas)

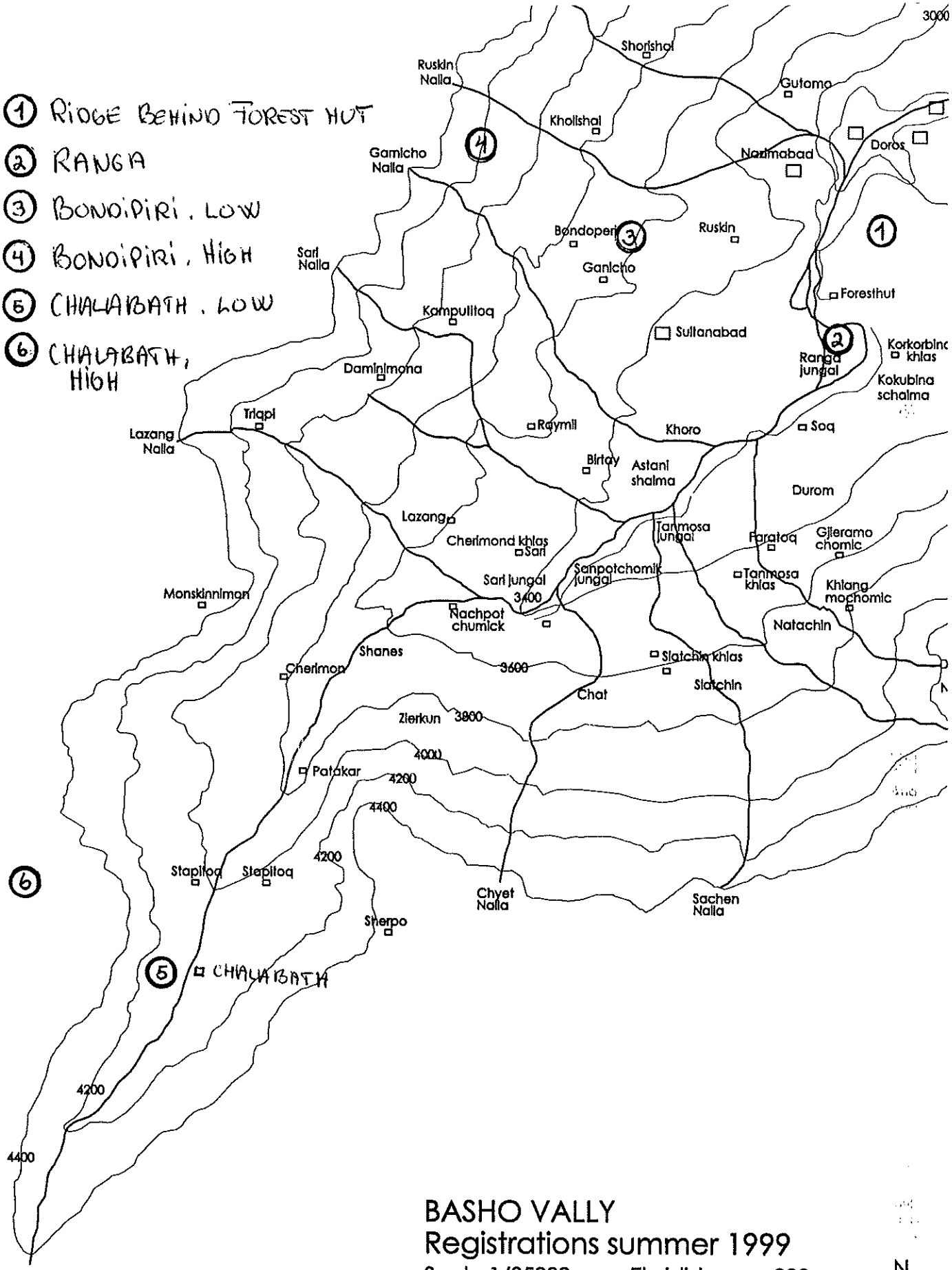
APPENDIX 6: COMPARISON KHAPLU AREA AND BASHO WATERSHED

Impressions from a two- day, brief survey in Khaplu (07.06.99 - 08.06.99) and field work in Basho 1998 and 1999. Sayed Ali, FMU Manager, and M. Ibrahim Social Organiser, FMU Khaplu, and Kacho Fazelay Hussain and Kacho Zahid Hussain participated in discussions and/or field trip. The researchers take the responsibility for any mistakes in the generalisations made in the matrix.

	Khaplu (Alpine case: Hunjor Broq)	**Basho (except Matillo)**
Land use:		
Cultivation.	Most arable land cultivated	Considerable amount of arable land uncultivated.
Cultivation and livestock	Effective protection of cultivated plots from grazing (during cult. season).	Protective systems still under development.
Irrigation	Most water resources utilised	Still water surplus for new irrigation projects.
Lower *broq*	Lower *broq* fully cultivated	Lower *broq* with some plots and some grazing.
Lower *khlas*	Lower *khlas* transformed to seasonal farmhouses (secondary homes during cultivation season)	Lower *khlas* primarily animal sheds
Farmland infra-structure	Good farmland infrastructure (both in village and *broq*): roads and paths for humans, fenced routes for ruminants etc.	Less developed farmland infrastructure.
High pastures	Extremely high pressure by grazing and firewood collection (artemisia and juniper bushes etc. are scarce)	High pressure by grazing, not collection of vegetation for fuel
Natural forest	No natural forest	Natural forest
Economy:	**Khaplu (Alpine case: Hunjor Broq)**	**Basho (except Matillo)**
People and land use	"Farmers with animal husbandry"	"Pastoralists with farmland"
Production system	Production system settled.	Production system in change.
Farm-forestry	Farm-forestry traditions.	Farm-forestry introduced.
Trade and travel	Trade and travel traditions.	Isolated before 1965.
Cash income	Trade, agroforestry, agriculture (potatoes), public sector, tourism, animal husbandry, NGO-related employment	Natural forest, animal husbandry, NGO-related employment.
Timber	Agroforestry (net. export). Some import of high quality timber	Natural forest and agroforestry (net. export)
Fire and fuelwood	Agroforestry, bushes, dung, purchase (net. import)	Natural forest, agroforestry, bushes (net. export)

Institutions	**Khaplu (Alpine case: Hunjor Broq)**	**Basho (except Matillo)**
Main impression	"Urban and settled": Raja/public institutions/Bazaar are closer	"Remote and in change"
Access to higher *khlas*	Village *khlas* in higher pastures.	Household *khlas* more common in higher pastures (But village *khlas*es in the highest pastures).
Conflict resolution, plots	One single elder, the *Broq*cho ("*Broq* Raja") resolves land and water conflicts at *broq*	Elders (Conflict Resolution Committee)
Rights and access to pastures	• Recorded subdivision of rights (among villages) are settled and operative • Well-established system of pasture leasing • Well-established systems of animal lease and Barpa ownership to animals • Open access among right holders (no limitations)	• Recorded rights partly challenged by ongoing occupation and conflict resolution. • No settled system of pasture leasing • Well-established systems of animal lease and Barpa ownership to animals. • Open access among right holders (no limitations).
Education	Most boys are educated. Girl schools available	25- 40% of the boys attend primary school. Girls religious classes planned
AKRSP main tasks.	Improvement of agricultural production	Institutional development and training, land development

APPENDIX 7: Map of Basho valley showing the selected sites for movable cages and enclosures

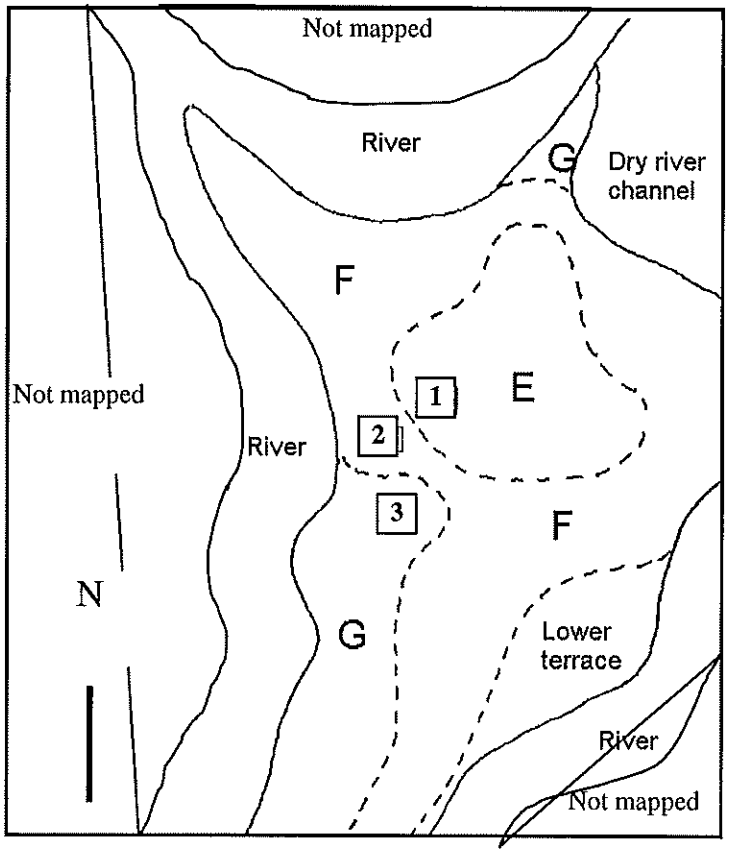


APPENDIX 8: DESCRIPTION OF SOIL AND TOPOGRAPHY AT THE SITES

Ranga

Flat river flood plane surrounded by active stream channels (Basho river). Three different soil types are found:

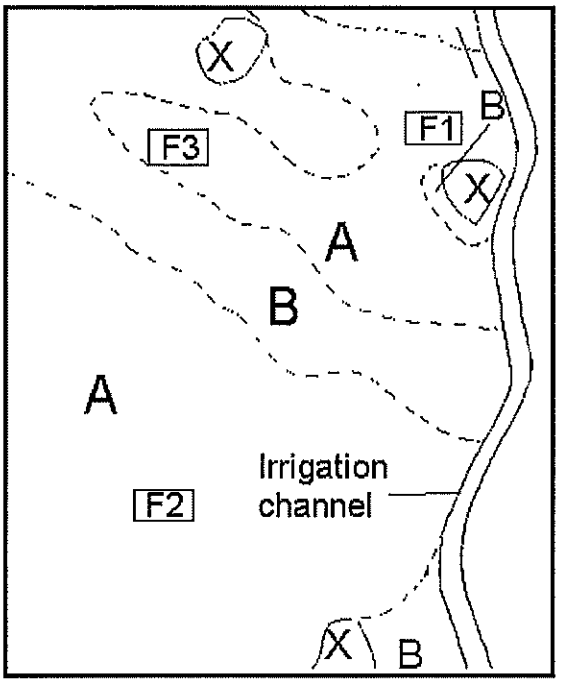
- A poorly drained fluvisol (E) characterized by a 2 to 5 cm thick organic surface layer over a silty subsoil with sandy layers. Groundwater level at 40 to 60 cm depth (30 June). This soil was found in the central parts of the 'island'.
- An imperfectly drained fluvisol (F) characterized by a silty topsoil and sand layers in the subsoil. Groundwater level at 60 to 80 cm depth. This is the dominating soil at this site.
- A well drained Arenosol (G) characterized by sandy topsoil low in organic matter and a sandy subsoil with groundwater level deeper than 80 cm. This soil was found along the stream channels.



Map 1: Map sketch of moveable cage site at Ranga, The scale is about 1:1500. The boxes mark cage locations.

Lower Bondopiri

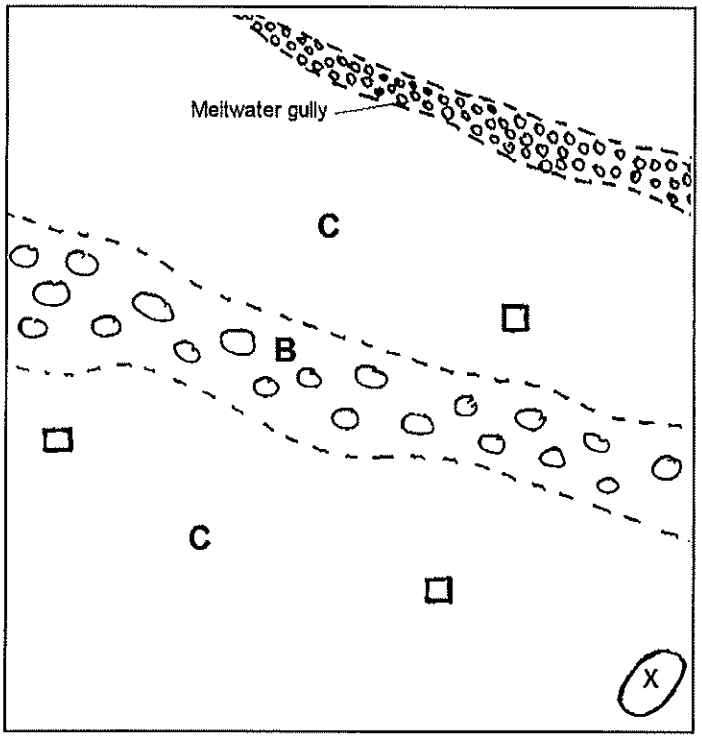
A southeast sloping landscape (30 – 50 % slope) about 500 m higher than the valley floor (3600 m elevation), dominated by v-shaped gullies between southeast oriented rocky ridges. The soils between the ridges are cambisols or luvisols (**A** on map) and have a 50 cm thick loess layer (high in silt and fine sand) over coarse textured glacial material. This soil is described in detail in appendix 11. The ridge tops (**B** on map) lack the loess layer and is dominated by coarse fragments up to big boulders



Map 2. Map sketch of permanent enclosures and moveable cage sites (F1,2,3) at Lower Bondopiri. The scale is about 1:1,700

Upper Bondopiri

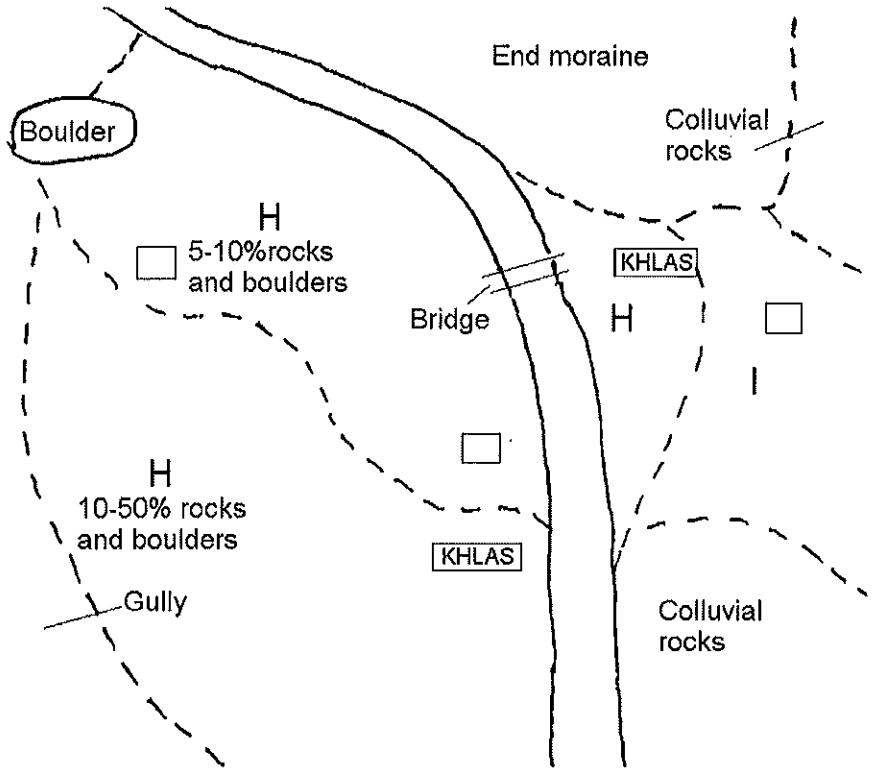
A southeast sloping landscape (60 – 70 % slope) about 900 m higher than the valley floor (4000 m elevation), dominated by southeast oriented rocky ridges (**B**) with sediments deposited by landslides and avalanches in between. The soils are weakly developed (mainly regosols) and have a sandy loam or loam texture with high gravel and rock content (**A**). The soil surface has a gravel and rock cover of 25 – 100 %.



Map 3. Map sketch of moveable cage sites (squares) at Upper Bondopiri. The scale is about 1:300.

Lower Chalabat

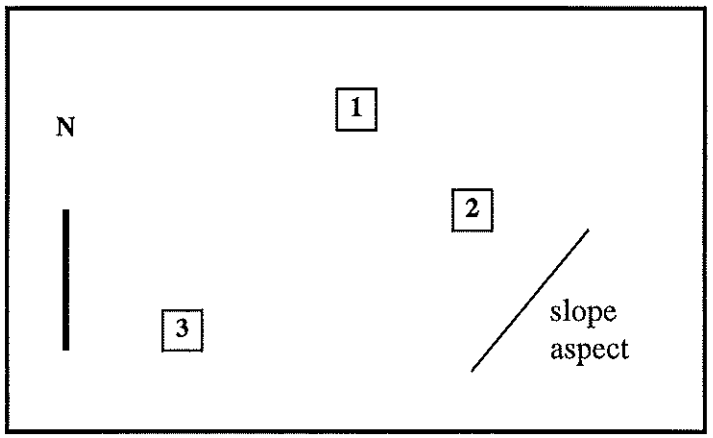
This site is located at Chalabat broq, on a small grassy meadow in the valley bottom at 3,800 m elevation. A flat to gently sloping river flood plane with scattered boulders dominates the eastern side of the river. The soils (**H**) are very similar to the Ranga soils (fluvisols). The topsoil has a high content of silt and fine sand, with or without an organic top layer. The subsoil is sandier and has several buried organic layers. The western side of the river has a narrow flood plane along the riverbank, and a colluvial fan toe-slope converging into steep and rocky colluvial (scree) fans when you move away from the river. The soils (**I**) on the fan toe-slope (where the cage is located) have a thin organic surface layer over a rocky sandy loam Bw-horizon (cambisol). Rocks and boulders dominate at 40 cm depth.



Map 4. Map sketch of moveable cage sites (marked by boxes) at Lower Chalabat. The scale is about 1:1000.

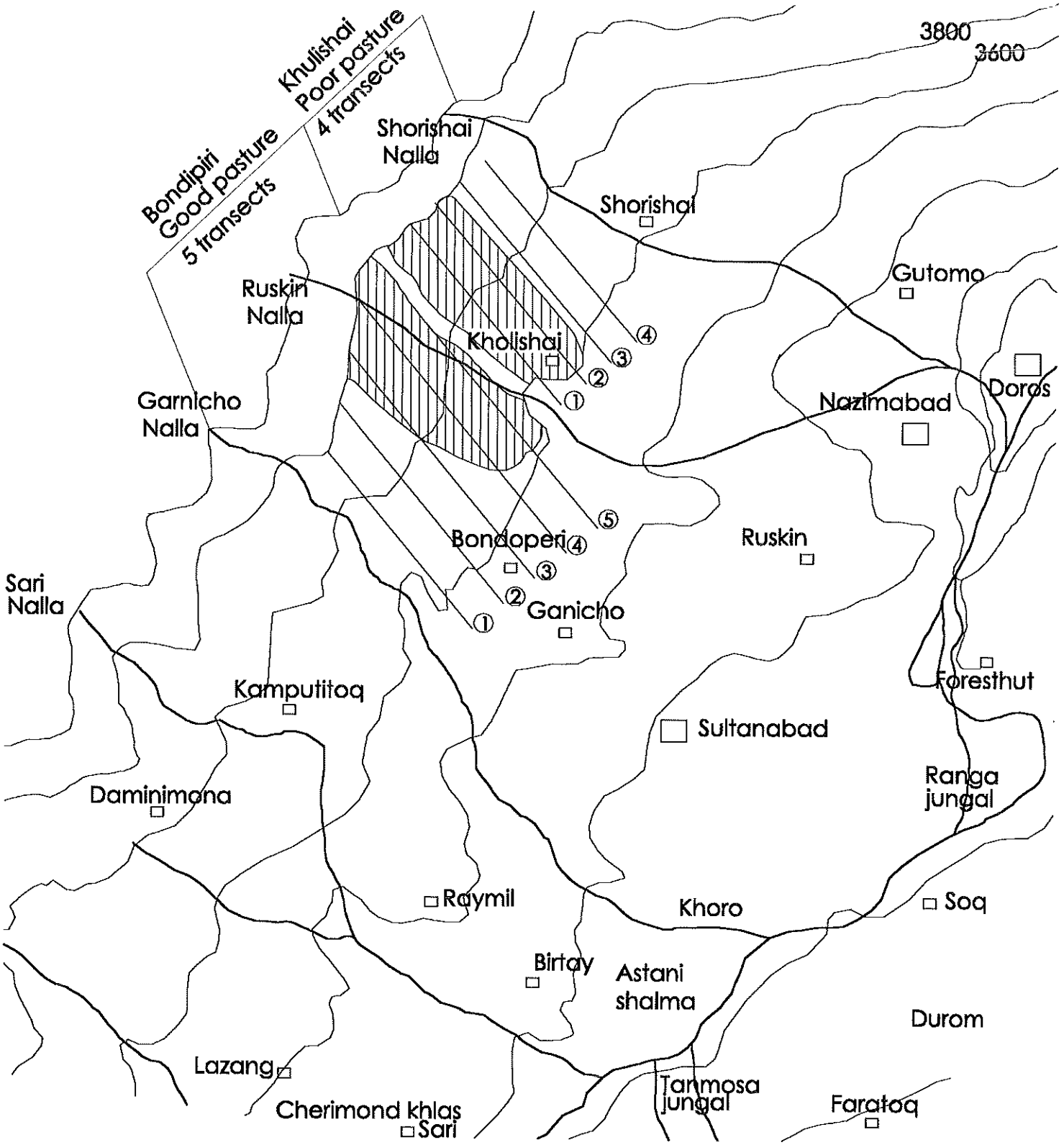
Upper Chalabat

This site is located on the upper part of a stable (vegetated) colluvial fan at about 4000 or 4100 m elevation. The slope varies from 60 to 80 % in a northeasterly aspect. The soil surface has a 10 to 30 % cover of gravels and coarser fragments, and is characterized by terracettes (steps) made by grazing cattle. The soils are rich in organic matter, have a rocky sandy loam texture and have a subsoil dominated by rocks and boulders starting at 40 to 50 cm depth.



Map 4. Map sketch of moveable cage sites (marked by boxes) at Upper Chalabat. The scale is about 1:300.

APPENDIX 9: Map of Bondipiri and Kholshai pasture with transects



APPENDIX 10: THE LATINSQUARE OF TRAMPLING TREATMENTS IN ENCLOSURES

1 m^2 squares in 3 x 3 m plots

L	C	H
H	C	L
C	H	L

Enclosure F1

H	L	C
L	C	H
C	H	L

Enclosure F2

C	H	L
H	L	C
L	C	H

Enclosure F3

Treatments:
H = 500 hits with rod

L = 250 hits with rod

C = control

APPENDIX 11: SOIL PROFILE DESCRIPTION AND SOIL PHYSICAL AND CHEMICAL DATA AT ENCLOSURE F2

Location:	2m east of enclosure F2 at Lower Bondopiri
Topography:	Straight east facing 50 % slope.
Surface features:	Smooth surface with < 1 % cover of coarse fragments.
Parent Material:	Loess (windblown silt and fine sand) over glacial deposits rich in carbonates.
Internal drainage:	Well drained.
Soil moisture:	The soil was dry to 30 cm depth and slightly moist to deeper than 120 cm.
Classification:	Calcic Haplustalf (Soil Taxonomy 1998), Calcic Luvisol (FAO 1990).
Remark:	Described 29. of June, 1999, warm and dry weather.

Description of horizons:

A (0 – 2 cm) Very dark grayish brown (10YR 3.5/2) moist and pale brown (10YR 6/3) dry, silt loam; weak surface crust with underlying weakly developed thin (2 - 4 mm) platy structure; abrupt and smooth boundary.

ABd (2 – 5 cm) Dark grayish brown (10YR 4/2) moist and light yellowish brown (10YR 6/4) dry, silt loam; strucktureless (massive) and compact; very few fine pores (3/dm^2); very fine roots in most pores; clear and smooth boundary.

Bw (5 – 17 cm) Dark grayish brown (10YR 4/2) moist and light yellowish brown (10YR 6/4) dry, silt loam; moderately developed fine and medium subangular blocky structure; slightly hard when dry; very few fine pores (5-10/dm^2) and common very fine pores (100-200/dm^2); common very fine roots (100-200/dm^2) within and between blocks; clear and slightly wavy boundary.

Bt1 (17 – 53 cm) Dark grayish brown (10YR 4.5/2) moist and pale brown (10YR 6/3) dry, silt loam; moderately developed medium prismatic structure; slightly hard when dry; very few fine pores (5-10/dm^2) and common very fine pores (100-200/dm^2); very few very fine roots (10-20/dm^2) within and between prisms; clay films observed as pore linings; clear and slightly wavy boundary.

IIBt2 (53 – 65 cm) Dark grayish brown (10YR 4/2) moist and pale brown (10YR 6/3) dry, loam with 5 vol% gravels; moderately to weakly developed fine and medium subangular blocky structure; friable when moist; common very fine pores (100-200/dm^2); very few very fine roots (10-20/dm^2) within and between blocks; clay films as pore linings and as discontinuous coatings on aggregates; gradual and slightly wavy boundary.

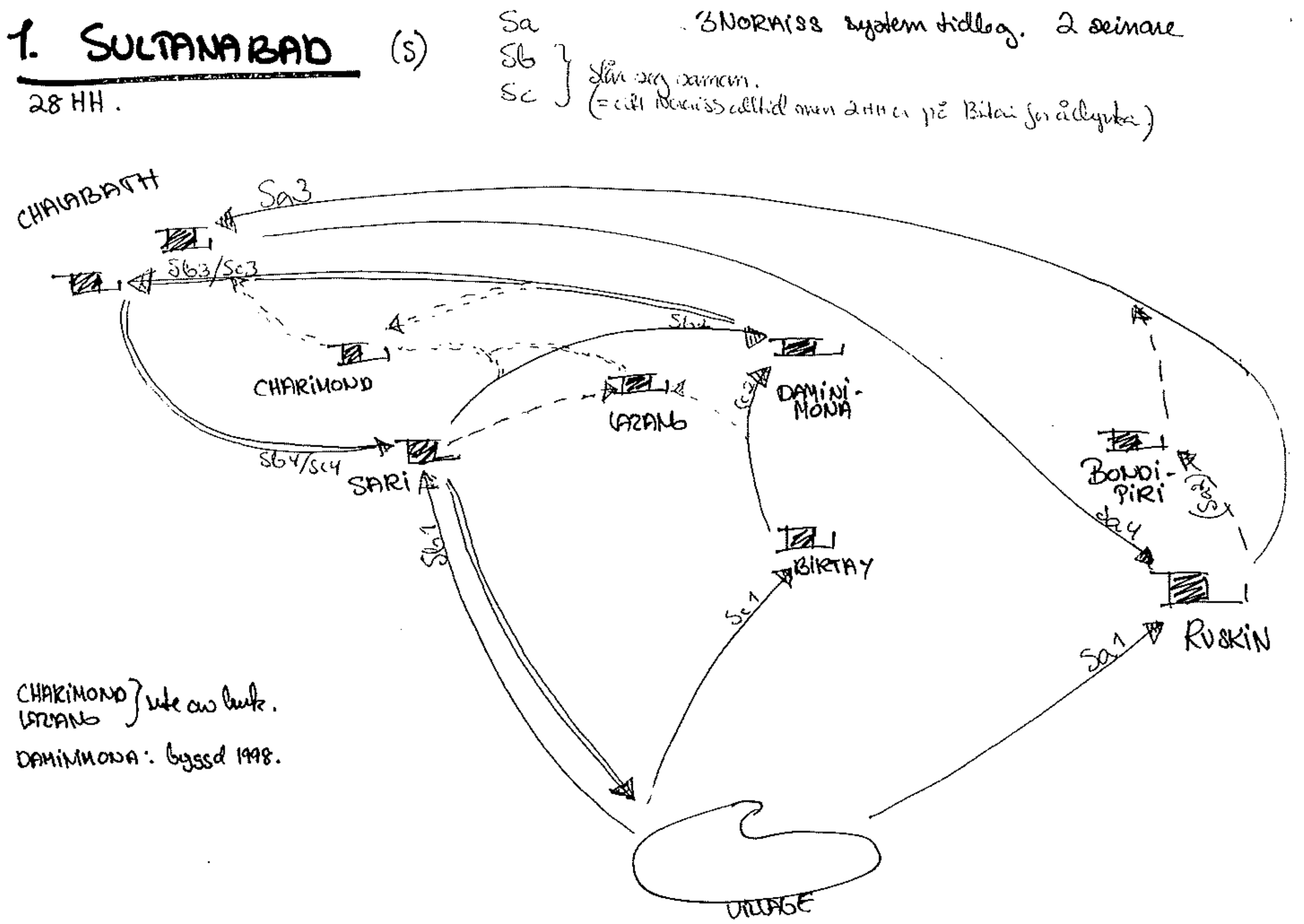
IIBt3 (65 – 83 cm) Dark grayish brown (10YR 4/2) moist and pale brown (10YR 6/3) dry, sandy clay loam with 30 vol% rocks and gravels; weakly developed fine and medium subangular blocky structure; very friable when moist; common very fine pores (100-200/dm^2); very few very fine roots (<1/dm^2); illuvial clay as bridges between sand grains; abrupt and partly interfingering boundary.

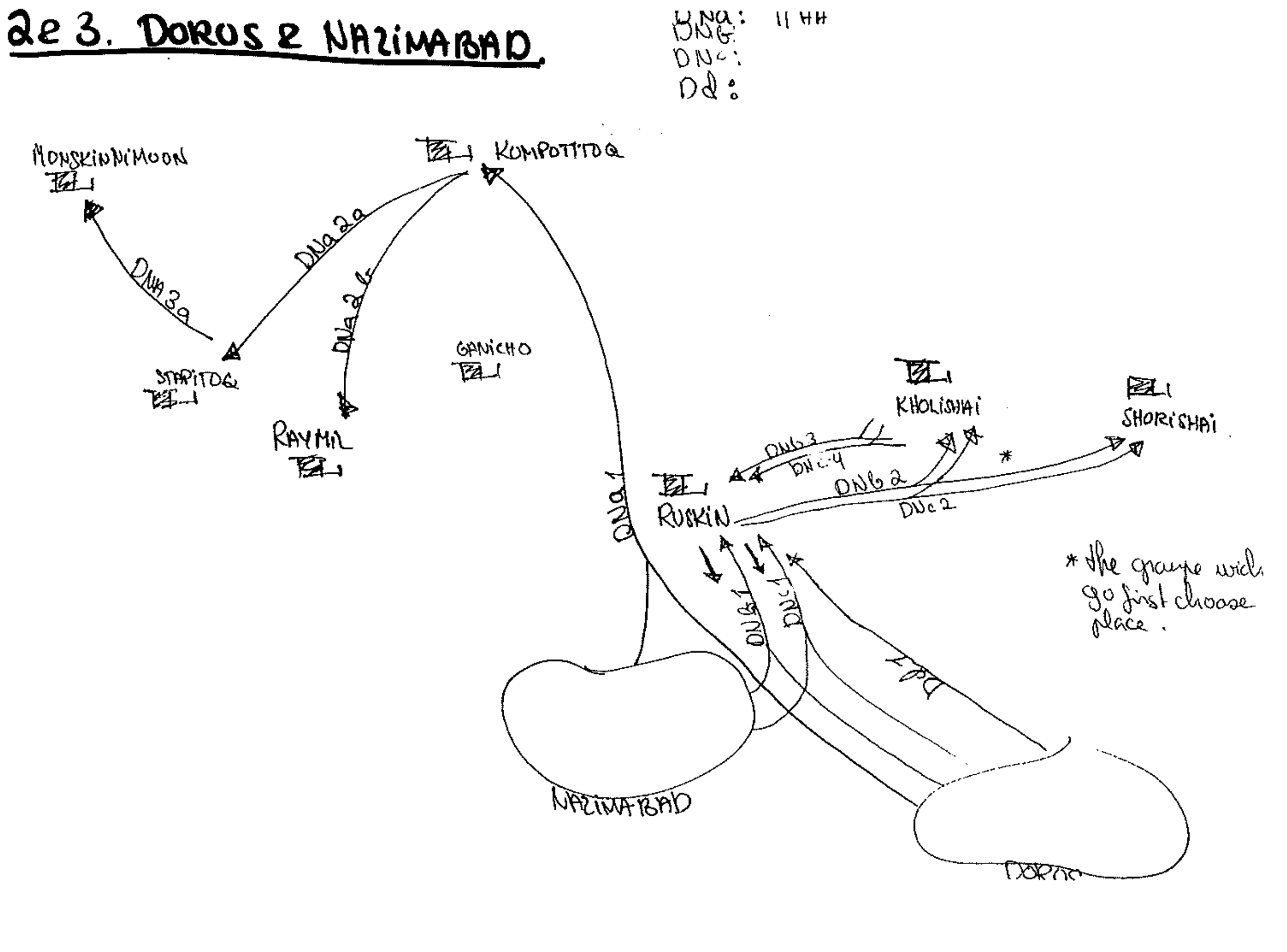
IIBk (83 – 120cm+) Light gray (10YR 7/2) moist and pale yellow (2.5Y 8/2) dry, loam with some large rocks; weakly developed coarse prismatic structure breaking down into 0.5 to 1 cm thick platy layers; very friable when moist; common very fine pores (100-200/dm^2); very few very fine roots (<1/dm^2); white (2.5Y 8/1) secondary carbonates as veins between plates and thick coatings on prisms and under rocks, both matrix and coatings are highly effervescent in 1M HCl.

Soil physical and chemical data (results from soil sample analyses not available)

Horizon	*Depth (cm)*	*Particle size distribution (%)*			*Soil moisture content (wt%)*	*pH*	*Organic matter content (%)*	*CEC*	*Base saturation (%)*	*CaCO3*
		clay	silt	sand						
A	0-2				n.d.					
ABd	2-5				0.4					
Bw	5-17				2.2					
Bt1	17-53				5.1					
IIBt2	53-65				5.1					
IIBt3	65-83				7.1					
IIBk	83-120				11.7					

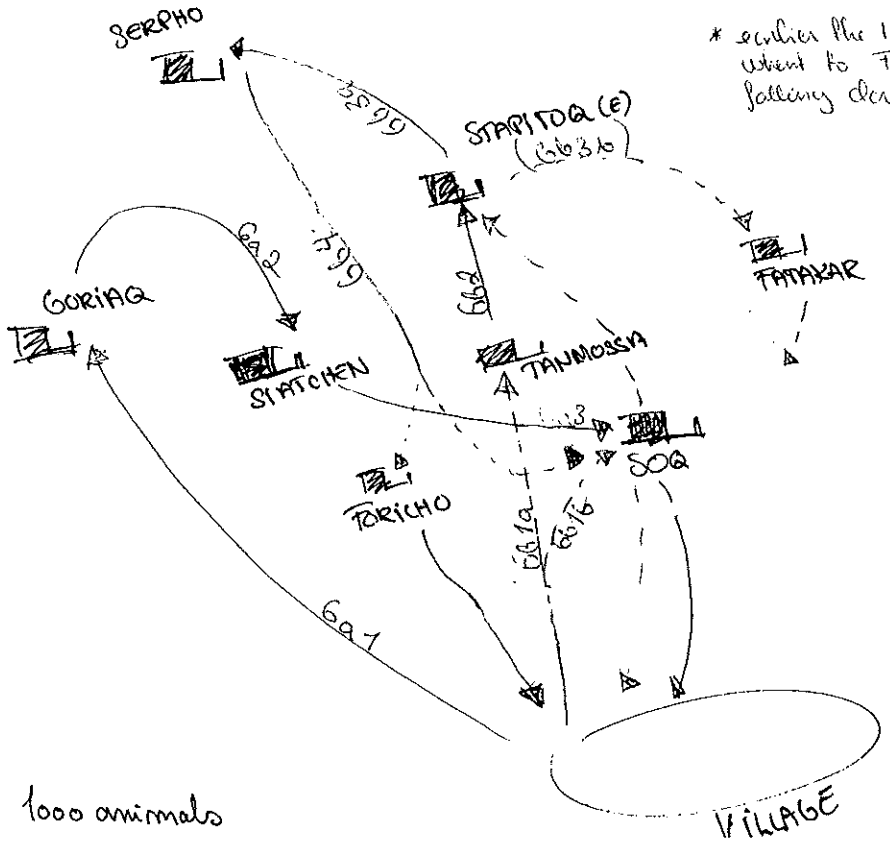
APPENDIX 12: Sketches of the noraiss groups movement patterns at village level





5. GUNTHO (6)

6a 8 HH
6b 15 HH



* earlier the 15 HH at Stapitoq divided and went to Fatakar or Sogo. Now: Fatakar is falling down (Met ogani at Toricho or Soq)

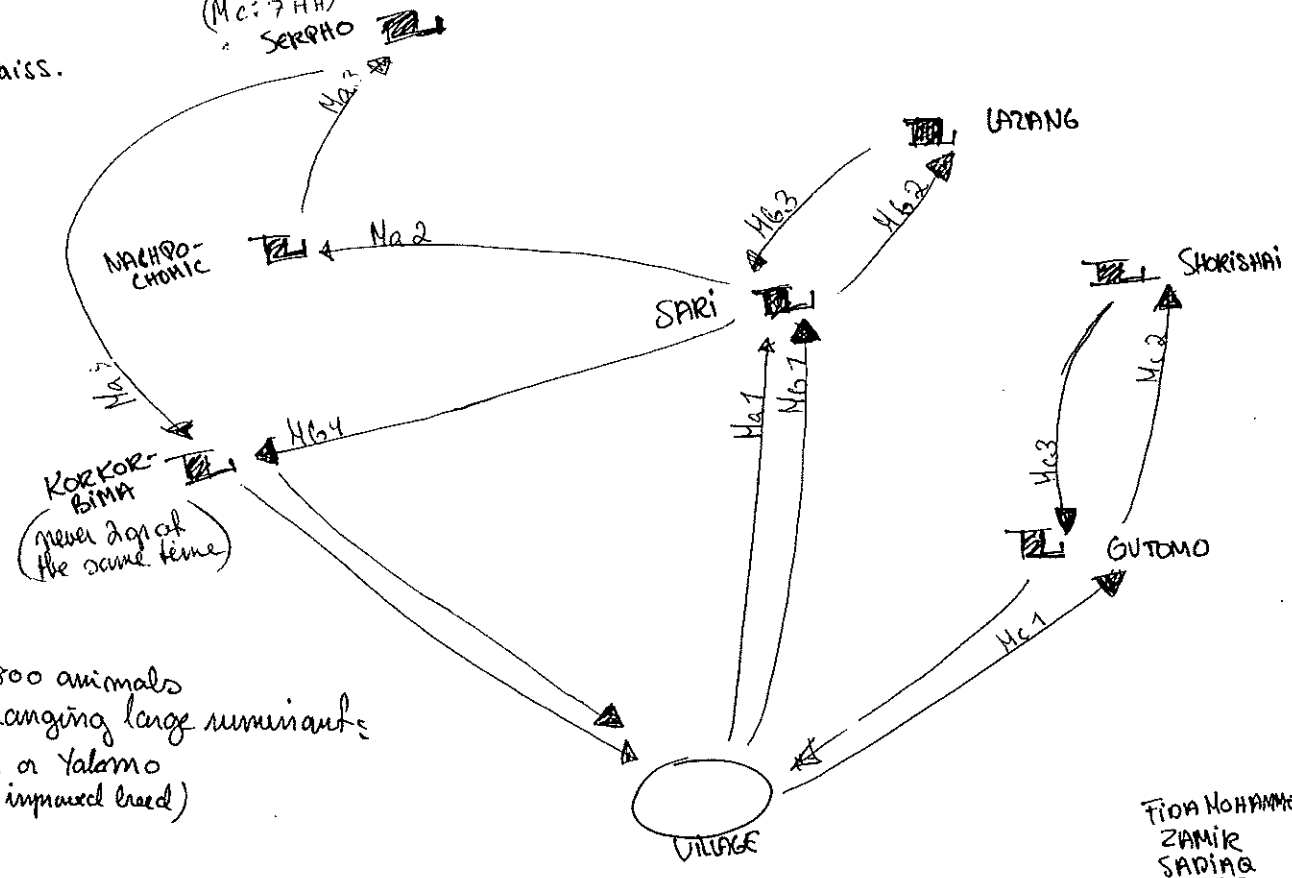
* Move down from Sogo when Khan village is leaving Soq!

1000 animals

4. MEITO (M)

44 HH.
2 d. 3 Nariss.

M6: 15 HH
(Mc: 7 HH) — this groups only sometimes.



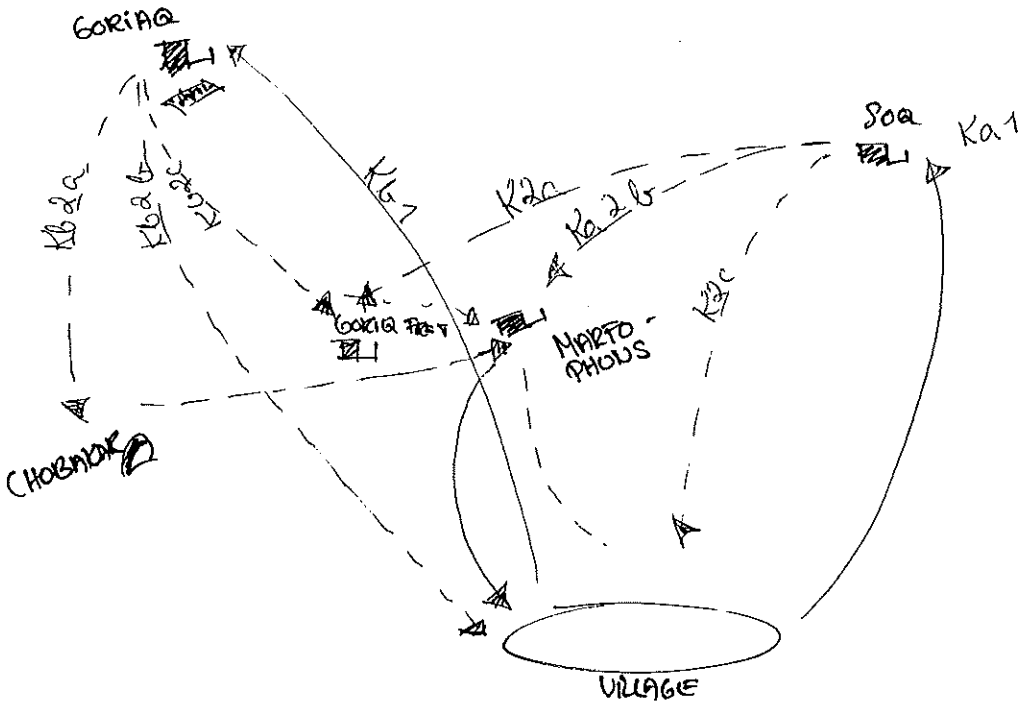
700 - 800 animals
100 free ranging large ruminants:
No YAK or Yalomo
(7 sheep. improved breed)

FIDA MOHAMMED
ZAMIR
SADIAQ
SHABIR
ICHAR

6. KHAR (K)

28 HH
500 animals

Ka : 6 HH
KB : 10 HH

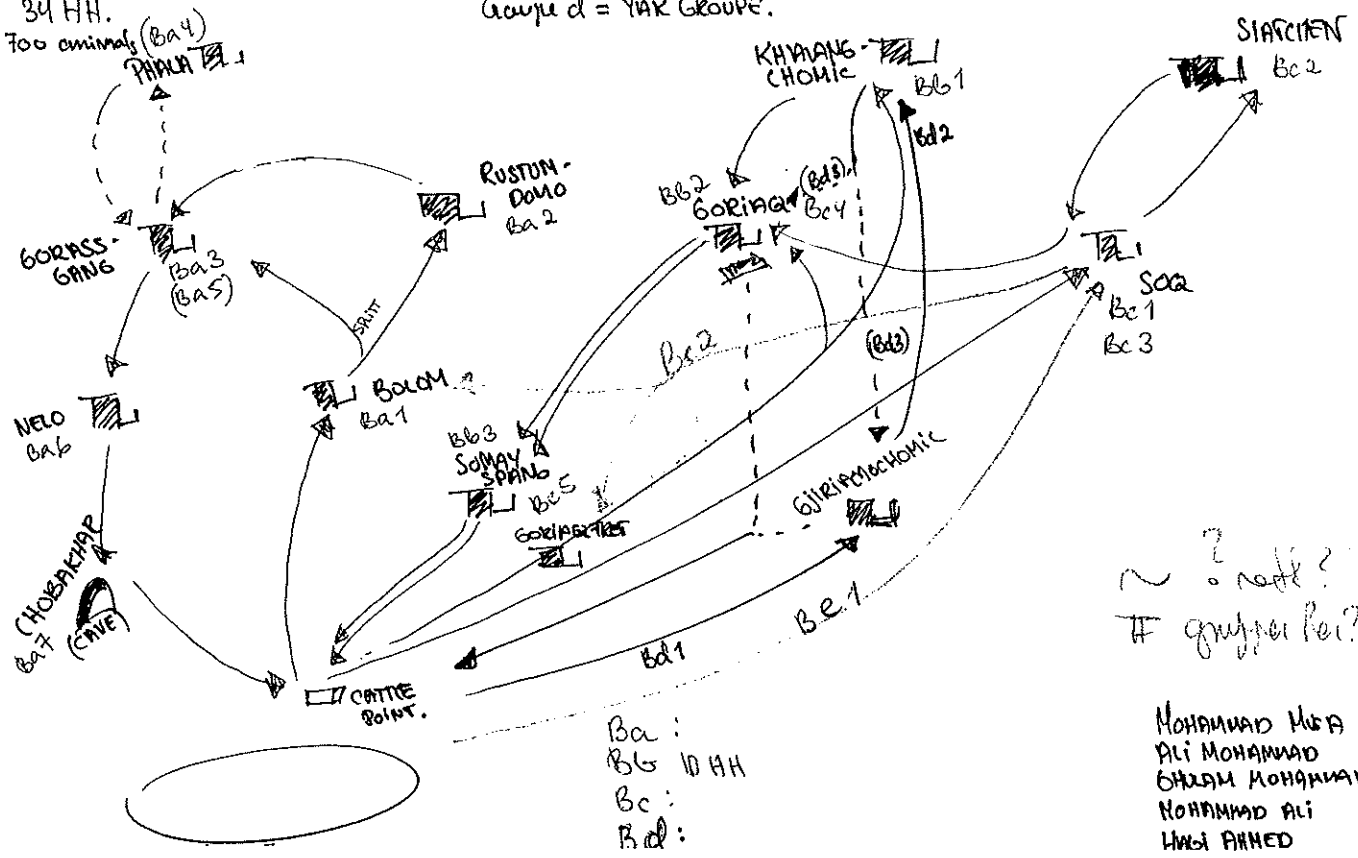


7. BATHANG (B)

3 Noraiss (a.b.c) + d
11 BROQS
Groupe d = YAK GROUPE.

a: only large ruminants
d: Yak groupe

34 HH.
700 animals



Ba :
BB 10 HH
Bc :
Bd :

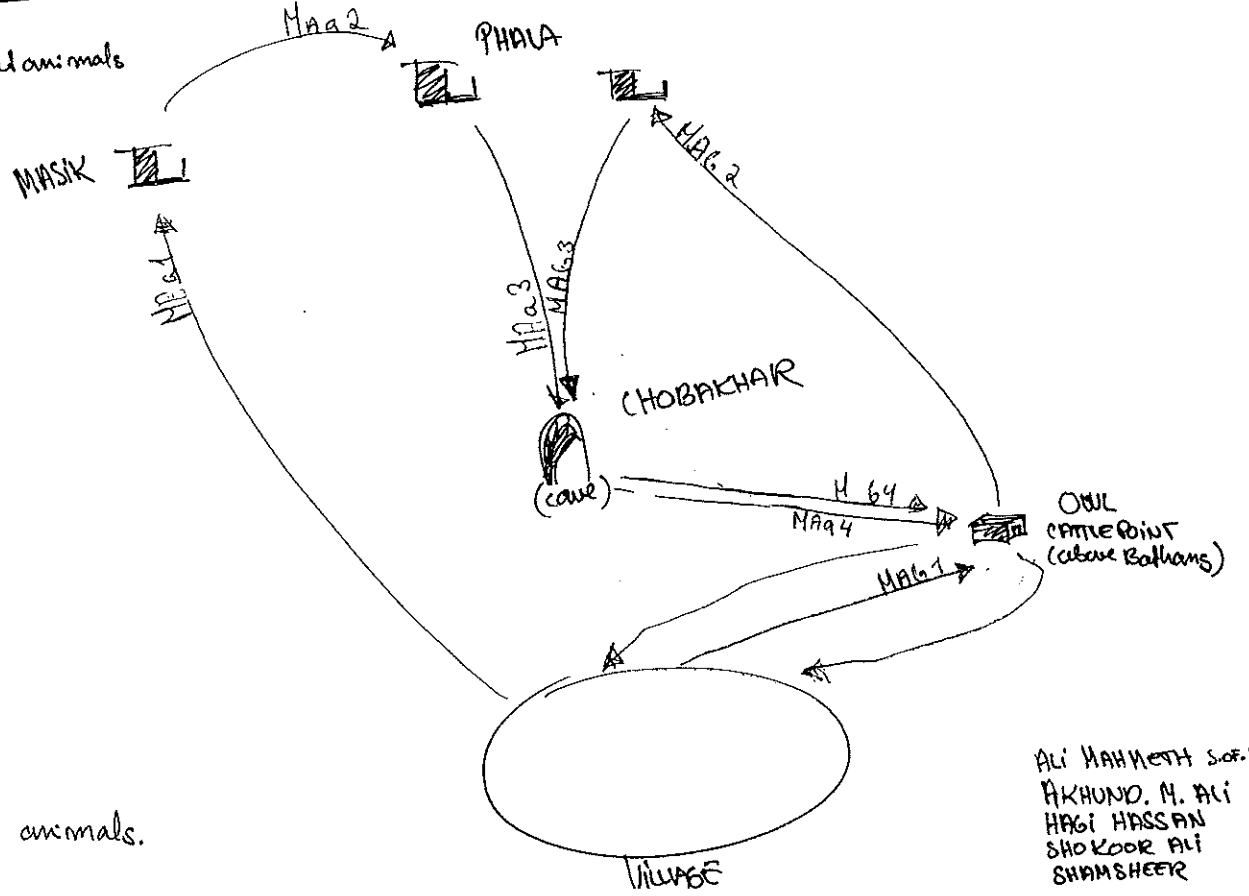
~ ? noté ?
H groupes Per?

MOHAMMAD MUSA
ALI MOHAMMAD
GHULAM MOHAMMAD
MOHAMMAD ALI
HAJI AHMED

8. MATILLO (MA)

MHa : 15 HH
MAG : 15 HH.

45 HH.
15 without animals



1000 animals.

ALI MAHMOUD S.OF. ALI NAKI
AKHUND. M. ALI
HAGI HASSAN
SHOKOOR ALI
SHAMSHEER

APPENDIX 13: Table of broq used and noraiss groups and number of animals in Basho valley

No	Broq	# khlases	Villages	# khlases	# noraiss	# HH	# large	# small	Moving patt.	When used						# of days	Cultiv.	Age
										M	J	J	A	S	O			
1	Chalabath		Sultanabad	1 (east)	1				Sb3, Sc3								0	
*	*	*	Sultanabad	1 (west)	1				Sa3								0	
2	Serpho	1	Meito	1	1	8	20	140-150	Ma3	****	****	**XX	XX**	**	****	30	0	
*	*	*	Ghunto		1	15	?	?	Gb3								0	
3	Monskinnimon	1	Nazimabad + Doros	2	1	11	0	200	DN3a								0	
4	Stapitoq	2	Ghunto	1 (east)	1	15	?	?	Gb2								0	
*	*	*	Nazimabad + Doros	1 (west)	1	11	0	200	DNa2								0	
5	Fatakar	(1)	Ghunto	1	*	*	*	*	(Gb3)	*	*	*	*	*	*	*	0	40?
6	Charimond		Sultanabad	1	*	*	*	*	(Sb2, Sc3)	*	*	*	*	*	*	*	0	?
7	Sari	12	Sultanabad	10	1				Sb1,Sb4	***C	**XX	XX**	****	****	****	30	yes	old
*	*	*	Meito	2	1	8	16-18	120	Mb1,Mb3	***C	**XX	XX**	***X	XXX*	****	30+30	yes	old
*	*	*	Meito	6	1	8	20	140-150	Ma1	***C	**XX	XX**	****	****	****		yes	old
8	Lazang	2 + (2)	Nazimabad + Doros	1(+2)	1	*	*	*	Sc2	*	*	*	*	*	*	*	0	old
*	*	*	Meito	1	1	8	16-18	120	Mb2	****	****	**XX	XXX*	****	****	40	0	old
9	Daminimona	1	Sulatanabad	1	1	10			Sb2, Sc2								0	1
10	Raymil	4	Nazimabad + Doros	4	1	11	45-60	0	DNa2b	****	****	XXXX	XXXX	****	****	60	Yes	
11	Kamputitoq	1	Nazimabad + Doros	1	1	11	45-60	200	DNa1	****	**XX	XXXX	X***	****	****	50	0	
12	Birtai	2	Sultanabad	2	1	2	7	20	Sc1	***C	**XX	XX**	****	****	****	30	Yes	
13	Ganicho		Nazimabad + Doros?															
14	Bondipiri	1	Sultanabad	1	1	14	?	?	(Sa2)	****	**XX	****	****	****	****	15	0	b. 1997
15	Shorishai	1	Nazimabad + Doros	1	2?	11+7	50	300	DNc2 or DNb2	****	**XX	XXXX	****	****	****	45	0	15-20
*	*	*	Meito	0	(1)	7	?	?	Mc2								0	15-20
16	Kholishai	1	Nazimabad + Doros	1	1	11	50	300	DNb2, DNc2	****	**XX	XXXX	****	****	****	45	0	15-20
17	Ruskin	21	Sultanabad	10	1	14	100	300	Sa1, Sa4	***C	XX**	****	XX**	****	****	15+15	1500	old
*	*	*	Nazimabad + Doros	4	1	11	100	230	DNb1, DNb3	***C	X***	****	XX**	****	****	10+15	600	old
*	*		Nazimabad + Doros	4	1	7	100	230	DNc1,DNc3	***C	X***	****	XX**	****	****	10+15		old
*	*	*	Doros	3	1	12	50	300	Dd1	***C	X***	****	XX**	****	****	10+15	400	old
18	Gutomo		Meito	1	(1)	7	?	?	Mc1, Mc3									
*	*	*	Guntcho															
19	Marphofons	1	Khar	1	1	8	?	?	(Ka2)									
20	Somayspang	1	Bathang	1	2?	11+10	90	370	Bb3, Bc5				*XXX					
21	Chobakar	4	Bathang	1	1	20	30		Ba7				**XX	X***	****		0	old
*	*	*	Khar	1	1	10	?	?	(Kb2)								0	
*	*	*	Matillo	1	1	15	30	90	MAa3	****	****	****	****	XXX*	****	30	0	
*	*	*			1	15	30	?	MAb2	****	****	****	***X	X***	****	15	0	
22	Nelo	2	Bathang	1	1				Ba6								0	old
*	*	*	Khar														0	
*	*	*	(Matillo)	1	0	0	0	0	*	*	*	*	*	*	*	*	0	

23	Bolom	3	Bathang	1	1	20	30	0	Ba1		**XX	X***				15-20	0	
24	Rustumdomo	1	Bathang	1	1	20	30	0	Ba2			*X**						
25	Gorasgang	2	Bathang	1	1	20	30	0	Ba3				**XX					
*	*	*	Khar	1		20	20-40	0	(Ba5)									
26	Masik	2	Matillo	2	1	15	30	90	MAa1	****	**XX	X***	****	****	****	30	0	old
27	Phala	4	Bathang	1	1	20	20-40	0	(Ba4)				XX				0	old
*	*	*	Khar	1													0	
*	*	*	Matillo	1	1	15	30	90	MAa2	****	****	**XX	XXXX	****	*****	45	0	
*	*	*	Matillo	1	1	15	30	?	MAb1	****	****	XXXX	XXX*	****	*****	50	0	
28	Goriaq	1	Bathang	1/3	2?	11+10	90	370	Bb2								Yes	old
*	*	1	Bathang	1/3	1	10	45	160	Bc4								Yes	old
*	*	1	Bathang	1/3	1	11	40-50	150-170	(Bd3)								Yes	old
*	*	*	Khar	1	1	10	?	?	Kb1								Yes	old
*	*	*	Guntho	1	1	8	?	?	Ga1								Yes	old
29	Gjiriamochomick		Bathang	1	1	11	40-50	150-170	Bd1	****	**XX	XXX*	****	****	****		0	
30	Khalangchomick		Bathang	1	1	11	40-50	150-170	Bd2	****	****	***X	****	****	****		0	
31	Foricho	1	Guntho	1	1	15	?	?	(Gb4)									
32	Korkorbima	1	Meito	1/2	1	8	20	140-150	Ma4	****	****	****	**XX	XX**	****	30	0	old
*	*	*	Meito	1/2	1	8	16-18	120	Mb4	****	****	****	****	***X	XX**	20	0	old
33	Soq	3	Bathang	1	1	10	45	160	Bc1,Bc3	****	**XX	X***	XX**	****	****		0	old
*	*	*	Khar	1	1	8	?	?	Ka1	****	***X	XXXX	XX**	****	****	50	0	old
*	*	*	Guntho	1/2	1	15	?	?	(Gb1, Gb4)	****	**XX	XXX*	****	***X	X***	45+15	0	old
*	*	*	Guntho	1/2	1	8	?	?	Ga3	****	****	****	****				0	old
34	Faratoq	*	Guntho?														0	
35	Tanmossa	1	Guntho	1	1	15	?	?	Gb1								0	
36	Siachen	2	Guntho	1	1	8	?	?	Ga2								0	
*	*	*	Bathang	1	1	10	45	160	Bc2								0	
37	Napotchomick	1	Meito	1	1	8	20	140-150	Ma2	****	**XX	XX**	****	****	****	30	0	30 ?
38	Goriaq fret		Bathang	1	1	8	?	?	Ka2									
39	Trickpi	1	?	1	*	*	*	*	*	*	*	*	*	*	*	*	0	old
40	Sonnonpochomic	1	Meito	1	*	*	*	*	*	*	*	*	*	*	*	*	0	old
41	Owl	?	Matillo					MAa4,MAb1, MAb4										

Sultanabad	S
Nazimabad	N
Doros	D
Bathang	B
Meito	ME
Gunto	G
Khar	K
Matillo	MA

(Khlas)	= fallen down
(Moving patt.)	= used some times depending on the season.
C	= going there fore cultivating the land (women)
X	= staying there with the animals
*	= not in use

APPENDIX 14: TABLES ON FOREST UTILISATION

Sources: We stress the preliminary nature of the calculations, which require further empirical verification and refinement of the model used. Information about wood consumption (i.e., extraction quantities, harvesting patterns, and species preferences) was collected through informal talks with AKRSP personnel, the Forest Department staff and villagers. Factual information on total number and size of households in the eight villages was obtained from local sources. The size of the forest areas and their distance from the eight different villages were recorded. The wood harvesting routes appeared to coincide roughly with the observation that user rights for the various villages occur primarily according to accessibility (cit. Mr. Jawad Ali). Variations in consumption patterns due to season and topographic location of the villages within the watershed were accounted for. Although the figures were compiled from several sources, scientific validation of the estimates was not possible. However, the results could be compared with a consumption study conducted previously in Rupal Valley, Northern Pakistan (Clemens and Nüsser, 1997).

Table 1. Village households firewood collection from different forests

Forest area	Wood Consumption from Different Forest Areas by Village								
	Matillo (%)	Bathang (%)	Khar (%)	Guncho (%)	Meito (%)	Doros (%)	Nazimabad (%)	Sultanabad (%)	Total (tons)
Mesik	25								50
Falah	45								89
Kilter	25								50
Tiemchan	5	5	5						25
Nilo		5							8
Bolom		20							31
Emeil									
Goriaq		55	70	50	15				321
Brimsar									
Forickcho									
Durom									
Tanmosa		15	20	45	70	70	70	40	669
Natachin									
Siachan									
Sonpochomic Shalma									
Chat						15	15	15	90
Zigirkon						5	5	10	41
Sharnias									
Ranga			5	5	5	5	5	5	59
Lasang									
Sari					10			15	57
Charimond								15	32
Sjuktop									
Kolisha						5	5		19
Shorisha									
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**1,540**

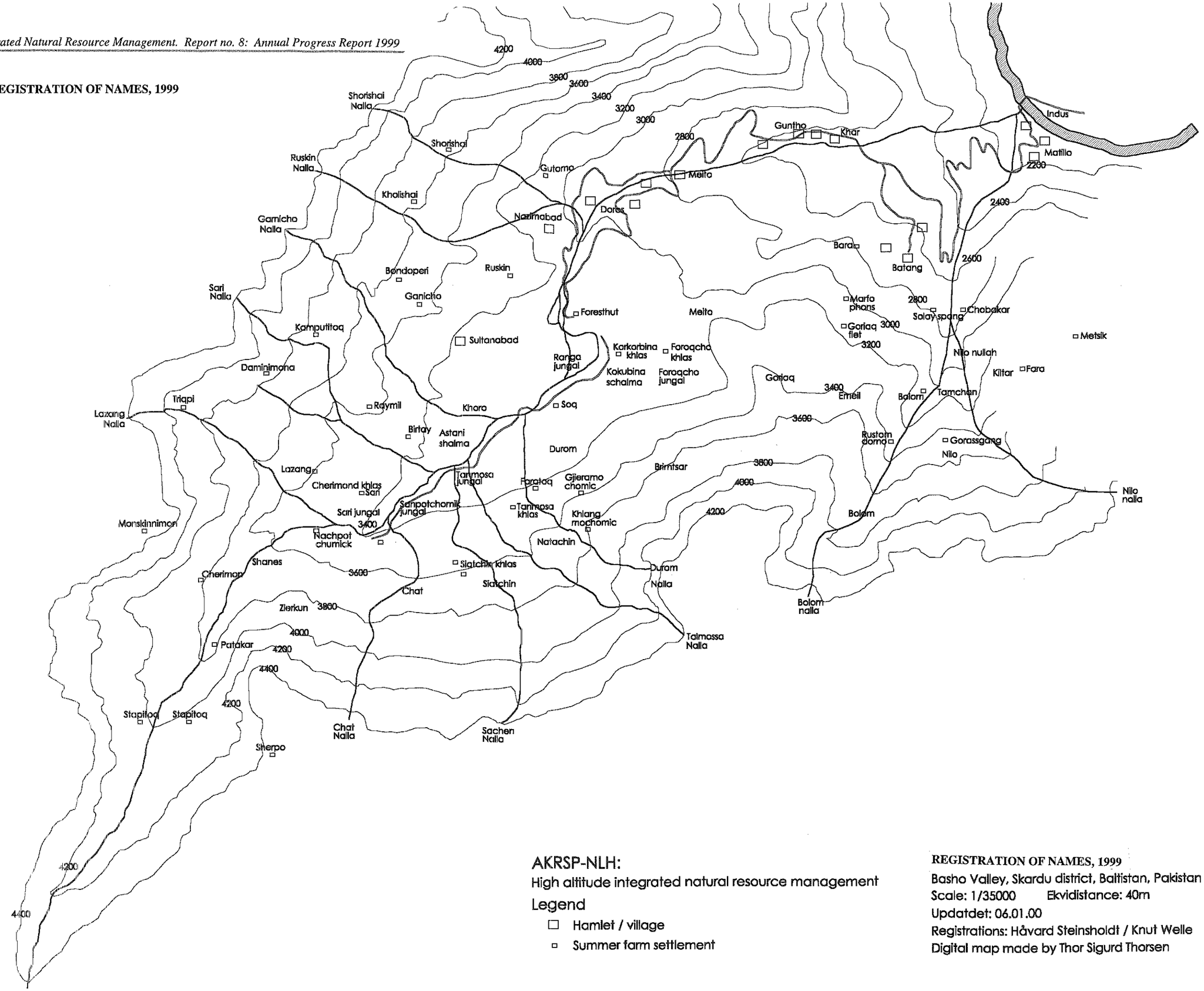
Table 2. House construction wood consumption

Village	No of house-holds	Mean wood consumption per household (tons)	Wood extracted from forest (%)	Wood consumed from home- garden (%)	No. of new houses	Construction timber (tons)
Matillo	55	6	60	40	3	15
Bathang	40	6	65	35	3	15
Khar	35	6	70	30	3	15
Guncho	36	7	75	25	3	15
Meito	45	7	80	20	3	15
Doros	26	7	85	15	3	15
Nazimabad	32	8	90	10	2	10
Sultanabad	28	8	95	5	2	10
TOTAL	**297**				**22**	**110**

Table 3. Summary of Consumption Patterns (tons)

Total firewood consumption	**1,540**
Total construction timber	**110**
Total wood consumption	**1,650**

APPENDIX 15: REGISTRATION OF NAMES, 1999



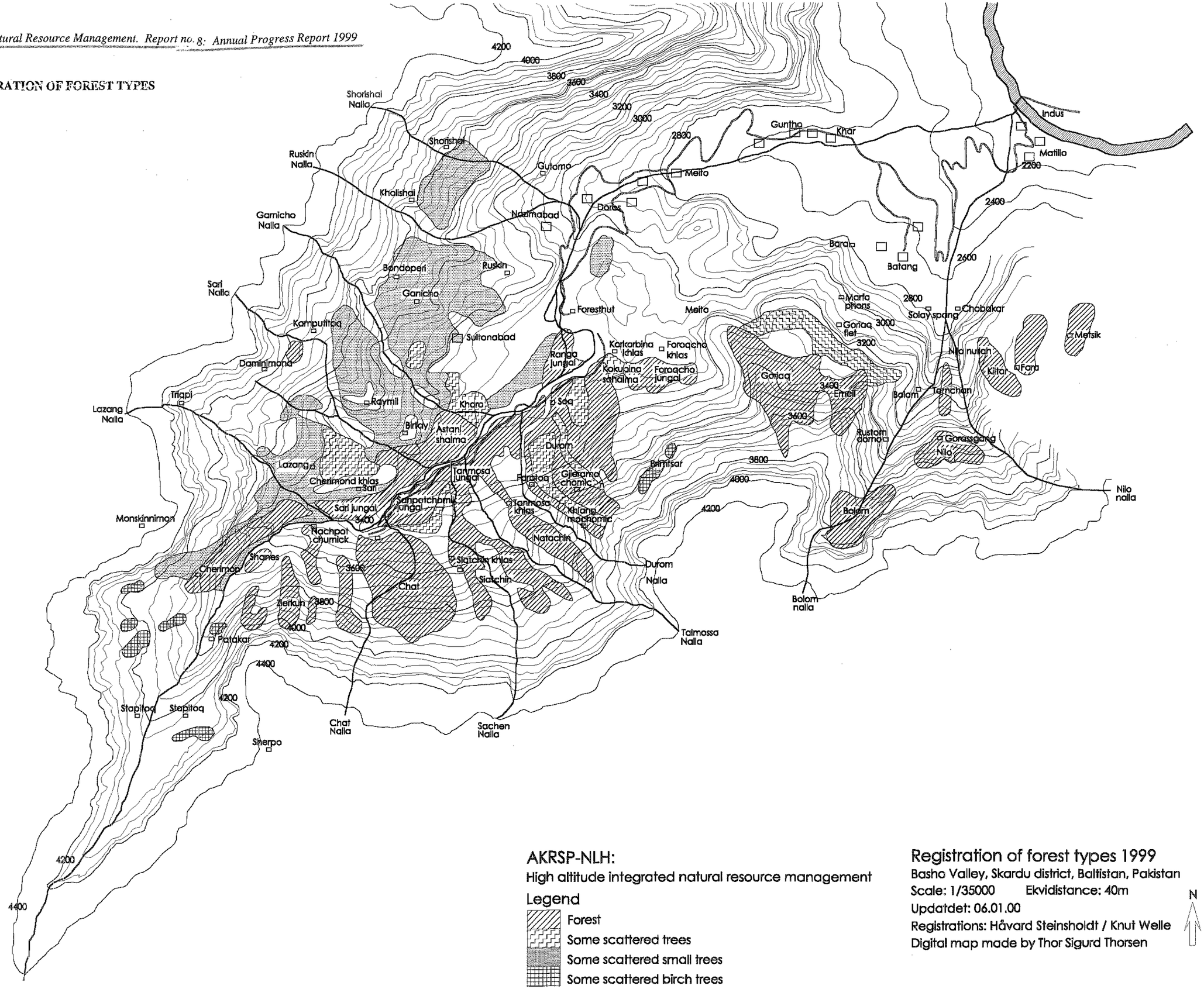
AKRSP-NLH:
High altitude integrated natural resource management

Legend
- ☐ Hamlet / village
- ▫ Summer farm settlement

REGISTRATION OF NAMES, 1999
Basho Valley, Skardu district, Baltistan, Pakistan
Scale: 1/35000 Ekvidistance: 40m
Updatdet: 06.01.00
Registrations: Håvard Steinsholdt / Knut Welle
Digital map made by Thor Sigurd Thorsen

N

APPENDIX 16: REGISTRATION OF FOREST TYPES



AKRSP-NLH:

High altitude integrated natural resource management

Legend

- Forest
- Some scattered trees
- Some scattered small trees
- Some scattered birch trees

Registration of forest types 1999

Basho Valley, Skardu district, Baltistan, Pakistan
Scale: 1/35000 Ekvidistance: 40m
Updatdet: 06.01.00
Registrations: Håvard Steinsholdt / Knut Welle
Digital map made by Thor Sigurd Thorsen

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