

3 Integrated Development Approaches: Improving Access to Rangeland Technologies, Markets, Alternative In- comes, and Financial and Social Services

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四川草地生态保护和建设模式



3 Integrated Development Approaches: Improving Access to Rangeland Technologies, Markets, Alternative Incomes, and Financial & Social Services

In this chapter, we provide summaries of eight oral presentations at the Lhasa workshop that revolved around various aspects of integrated development approaches, keeping in mind the interconnectivity between technologies, markets, financial capital, and access to social services.

Ze Bai from the Sichuan Provincial Grassland Institute presented the Sichuan Provincial Government's overall strategy for improving livestock production and livelihoods for the Tibetan plateau region of Sichuan. This includes the integration of development initiatives with ecosystem protection, vital to the sustainable development of the Tibetan plateau rangelands.

John Chesworth gave highlights of the Tibet PANAM project in Shigatse Prefecture of southern TAR. He focused on their proposed strategy for livestock improvement and marketing, including upgrading of livestock and access to global markets.

Sabine Meihe from Marburg University in Germany presented the results of their juniper restoration and outreach project, which included a field trip to observe outcomes and talk with local managers of the project. Juniper restoration has great potential, especially if combined with protection from grazing and community involvement in its management.

Chen Yuxiang from the Livestock Research Institute of TAAAS presented the outcomes of forage development trials in two different ecozones of TAR, the riverside agricultural zone of Lhasa valley (3600m elevation) and the purely pastoral high elevation zone of northern Tibet (4500m). They tested over 170 native and exotic species and identified a selection of annual and perennial grasses that have potential for future seed development, which remains the primary challenge for future development efforts.

Ethan Goldings presented the successes and challenges of Trace Foundation's efforts to develop and promote European style cheese made of yak milk. He argued that value addition of niche products from the plateau is the best and most culturally respectful means to improve cash income of local herders, rather than putting them in direct competition with lowland producers who are much more efficient at producing more conventional dairy and meat products.

Nandita Jain from the Mountain Institute (TMI) presented their work in community based-ecotourism in agro-pastoral regions of Ladakh and Sikkim, India. She emphasised the importance of developing alternative conservation models to enhance

livelihoods of communities who live and work around and within protected areas. She concluded that eco-tourism has great potential in these regions but only if viewed as supplementary to agricultural and livestock production.

Nyima Adack and Robert Campbell's paper presents the outcomes of more than five years of development work by the Tibet Poverty Alleviation Fund in Lhoka and Naqu Prefectures of TAR. They have had good success promoting micro-finance schemes, especially an innovative approach for community-based loans to nomad groups in Naqu. A future goal is to link micro-finance loan arrangements to rangeland rehabilitation as a means to improve community involvement in rangeland conservation.

Amchi Tenzing Bista and Yeshi Lama presented a paper discussing the valuable role that traditional Tibetan doctors (amchis) play in remote mountain communities, providing human and veterinary health services to those households who cannot afford more modern medicine. They then describe the formation of the Amchi Association, dedicated to training and promoting Tibetan amchis across the Himalayan range.



Ecosystem Protection and Sustainable Development Strategies for Sichuan Grassland

Ze Bai¹

Background

Sustainable development is an effective approach worldwide to environment and development problems. In China, sustainable development is a basic socioeconomic strategy on the agenda for the 21st century. Grassland ecosystem protection is currently one of the most important components of the sustainable development of regional economies in western China, and has attracted the interest of both central government and international society. Grassland ecosystems play important roles in natural resources and economic development. Thus, grassland ecosystem protection is a prerequisite for the sustainable development of regional economies and should be considered by development projects aiming at poverty alleviation and livelihood improvement.

The total grassland area of Sichuan Province is 20.4 million hectares. Occupying 42% of the province, grasslands are Sichuan's largest ecosystem – four times the size of the cultivated area and 1.5 times the size of the forested area. The Sichuan grassland (part of the Qinghai-Tibet Plateau) is one of the ten most biologically diverse areas in the world and is also characterised by ecological and cultural diversity. Sichuan grassland is one of the five largest pastoral areas in China. Of these five areas, the number of animals kept on the Sichuan grassland is the third largest, the output of major animal products is the second highest, and the output per unit

¹ Director, Sichuan Provincial Grassland Institute, Animal Husbandry Department of Sichuan Province, Xipu Township, Chengdu, PRC

area is the highest. Thus, this grassland is an important source of ruminant animal husbandry for Sichuan Province. The number of domestic ruminants on the Sichuan grassland is 55%, and milk output is 90%, of the total for the province. The Sichuan grassland is also an important source of water and wetland resources. Six tributaries of the upper reaches of the Yangtze River rise in the Sichuan grasslands, from which comes 24% of the water in the Three Gorges dam project. The upper reaches of the Yellow River are also located on 16,000 sq.km of Sichuan grassland.

Achievements and problems in grassland protection and improvement

The aim of this project was to use advanced technology, ecological balance, and economic efficiency to develop a superior model of the pastoral family farm. Our activities have provided an effective management model for grassland ecosystem protection, regional economic structural modification, and development of the individual herder family. Our achievements in the field include establishment of seed production, selection, and breeding bases; improvement of grassland management; and vegetation reclamation. We have established seed production units for important forage species such as *Lolium multiflorum*, *Elymus sibiricus*, *Trifolium pratense*, *Vicia villosa*, *Festuca arundinacea*, and *Medicago sativa*. We have also constructed new family farms and pastoral villages at demonstration sites.

Currently, of the total area of improved pasture in Sichuan (957,000 ha), 172,200 ha is cultivated pasture seeded with introduced grasses, and 475,600 ha is fenced pasture. Rodents and insects have been controlled on 4.1 million ha; 6.85 million kg of grass seed is produced per year on 10,800 ha; and pasture has replaced agricultural land on 63,850 ha. Nomads' level of responsibility has been increased with grassland leases, and better facilities have been developed for people, grassland, and livestock. Some 11.5 million ha of grassland (82% of utilisable grassland) has been contracted; 70,000 contracts have been signed; and 66,700 herder families (81% of families in the area) have developed the required "Three Matches" (a house, a barn, and fenced pasture for each family). On these family farms, houses covering 5.1 million sq.m have been built (77 sq.m per family), along with animal shelters covering 11 million sq.m (165 sq.m per family). In addition, 250,000 ha of fenced pasture (3.75 ha per family) and 27,000 ha of forage production area have been developed.

However, there have also been problems. About 10 million ha of Sichuan grassland (72% of the grassland) has become deteriorated, sandy and with rodent damage, resulting in worsened economic conditions. This has decreased grassland productivity by about 20% from 4,500 kg/ha in the 1980s to 3,600 kg/ha. Also, heavy soil erosion and ecosystem instability have reduced the local ability to survive natural disasters, and draining of marshland has decreased the preservation and manipulation of water resources. There are also problems with the low economic efficiency and slow development rate of local pastoral livestock production, coupled with high pressure on the grassland ecosystem. The dominant livestock species is the yak, characterised by low productivity and a long production cycle. Also local people usually pay more attention to yak numbers than to individual productivity. The marketing age of yak is very old at four or five years, and milk yield per lactation is 200-500 kg, only 5% of the yield of improved dairy cattle breeds.

Recommendations

Regional economic development must be paired with ecosystem protection. Humans come first, but we must also consider the environment. We must reform and extend traditional animal husbandry and introduce wise use of grassland resources. This includes developing replacement industries and a diverse economy, increasing farmer income and employment rate, and transferring herders to other professions to relieve the pressure on pasture. Great effort should be put into developing pastoral economics under the premises of ecological protection and security. Grassland ecosystem establishment and reclamation should be improved through science and technology. The sustainability and productivity of grassland ecosystem utilisation should be emphasised. Animal husbandry on these grasslands should be comprehensive, productive, and economically efficient and should provide high-quality, popular animal products.

Strategies for sustainable development of the Sichuan grassland include: 1) vegetation reclamation and improvement of grassland productivity in conjunction with ecosystem protection and sustainable development; 2) establishment of an animal production system that increases livestock production; 3) decreases in herder numbers through development of sustainable enterprises to relieve grassland pressure; 4) suitable law enforcement and monitoring systems for grassland resource exploitation; 5) increased awareness of the importance of environmental protection and sustainable development; 6) investment systems for grassland ecosystem protection and construction; and 7) enhanced cooperation in the mid and lower reaches of the Yangtze and Yellow Rivers on a mutually beneficial basis.

Regional improvement of grassland ecosystem protection and sustainable economic development will improve the productivity of grassland ecosystems, increase farmer income, and improve livestock and ecosystem health in remote, minority areas. These strategies will also protect and develop diverse local cultures, unite nationalities, and help modernise local society. They will benefit ecology, economy, and society in a sustainable and coordinated way.



Changing Perspectives In Livestock Production

John M. Chesworth¹

Background

The county seat of Panam County, TAR, lies in the valley of the Nian Chu River between Gyantse and Shigatse on the Friendship Highway from Lhasa south to Kathmandu. The larger part of Panam lies south of the Nian Chu River and contains several rivers that run north into the Nian Chu. The county consists of 11 townships, of which five at the northerly end receive irrigation water from a dam completed in 1996. The land becomes progressively higher to the south, and the southern townships have little or no agriculture and are principally used for upland grazing.

¹ Foreign Trade and Economic Cooperation Bureau, EU-China Panam Integrated Rural Development Project (PIRDP), Shigatse, TAR, PRC

Large changes in the region's economy are underway, including signing by the Chinese Government of the World Trade Organization protocol. Changes in infrastructure, such as completion of the railway line from lowland China to Tibet and large-scale upgrading of roads on the Tibetan plateau, will lead to great improvements in the transportation of goods. Together, these changes will lead to an eventual balance between prices for agricultural products and commodity prices. Producers are soon expected to face competition from other areas within and beyond the Tibet Autonomous Region. The seriousness of the challenge faced by producers is exemplified by the fact that some wholesale commodity prices within the county (such as for butter) are more than three times the world price. Producers whose costs are linked to a high value product will find themselves seriously undercut and may be unable to compete with large quantities of foreign goods brought in on new routes and sold at world prices.

Livestock production

Because of the dominance of agro-pastoralism in the northern townships, cattle are more numerous than yaks in the county. Beef, however, is considered a residual by-product, and only old animals are slaughtered. Due to inadequate feed, high calf mortality, and use for several purposes, dairy cattle productivity is extremely low. Sheep carcass qualities are also low, but imported rams have died in the past. There are local markets for pork, chicken, and eggs, but these are not being produced in high quantities.

Poor animal husbandry is acknowledged by both Tibetan and European opinion to be the major problem in livestock production. However, since this project is limited in time and resources, existing veterinary extension workers are being used to reach producers. Panam County has 60 such workers. Of these, two have three-year university degrees, two have two-year college degrees, and the remainder have at least three years of primary education, most having reached primary grade six.

As a result of the very low level of veterinary training, inappropriate treatments are common. For example, a group of veterinary workers revealed that they considered a placenta to be retained if it was not expelled within three hours after birth. Manual removal was then undertaken. Such intervention is likely to pose a significant threat to cattle fertility. Therefore, the main goal of this project is to strengthen the human resources in Panam County, focusing mainly on livestock disease control, rather than productivity. Most efforts are to be concentrated in townships receiving water from the county dam. The results of initiatives in these townships will be felt throughout the county.

There is little understanding in the region of the concept of commercialisation of livestock products. Dairy farming probably represents the most viable commercial output from livestock, but the production cycle is in excess of three years, making illustration of the relationship between input and output difficult. The shortest production cycle is that of broiler poultry, for which there are vigorous markets in Lhasa and Shigatse. As demand for poultry in these centres is currently being met from inner China, regional poultry production may offer a promising commercial opportunity.

Actions to be taken

A series of training courses will be conducted to address the most pressing management issues faced by livestock producers. Also, to provide a glimpse of the potential future competition as China becomes more closely linked to the rest of the world, at least four senior veterinary workers will be sent overseas. This experience will also demonstrate the efficiency possible in livestock production.

Along with an initial batch of 1,000 doses of Jersey semen from within China, the project will provide training in the use of semen in straws, detection of oestrus, and reduction of calf mortality. Feeding regimes and reproductive management techniques for high-yielding cattle will also be introduced.

Discussions are currently being held with villagers about the formation of groups interested in broiler and egg production. Broiler production has been chosen for the initial emphasis due to its lower capital costs and shorter production cycle. Assistance is being given with the purchase of plastic feeders and waterers, as well as netting and timber for the construction of deep-litter pens. Selected farmers will be given compound feeds, so that bird growth comparisons can be made between birds fed traditional poultry feeds and birds given feeds known to be nutritionally adequate. Assistance is planned for egg producers in upcoming years.

The project will assist in the formation of technical associations at several levels, including groups of farmers who can legally obtain credit. Such groups will need to ensure efficient marketing of products in the face of competition from commercial interests based in inner China.

Throughout the county, the forage base is rangeland grazing, augmented by fibrous crop by-products. The feasibility of forage production depends greatly upon the economic viability of alternative land uses. With the present low grain prices in the region, forage production and feeding to commercial livestock offers an attractive use of resources and a potentially high rate of return. Thus, several high-yielding plants are being evaluated, including varieties of beets, cereals, and legumes.



Towards the Green Belt in Southern Xizang – Initial Results of An Applied Research Project to Rehabilitate Degraded Rangelands

Sabine Miehe¹, Georg Miehe¹, and Katja Koch¹

(Background Information for the field trip, the poster is provided as an inset at the end of this chapter)

Background - environmental challenge and potential

The valleys and lower mountain ranges of south-central Tibet Autonomous Region (TAR), China, have a semi-desert appearance. Extremely long-term over-exploitation of the vegetation near Lhasa has caused severe erosion and a change from forest and scrub communities into open steppe. The main ramification for the local human

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population is a marked shortage in wood for construction and fuel. Dung is collected as a substitute for fuelwood, resulting in nutrient deficiency of rangelands and fields. The last remaining juniper shrubs – both the best firewood and a source of incense – are being uprooted in remote areas. In most places, where juniper has already been eradicated, other shrubs are being harvested.

Poplar and willow plantations on valley floors supply part of the rural demand for construction wood, but they offer only low-quality fuelwood and require irrigation or a high water table. Dry, non-irrigable mountain slopes are largely considered unsuitable for tree growth.

Relic trees on inaccessible cliffs or under religious protection suggest that the area might potentially be reforested with juniper. A comprehensive inventory of relic juniper populations – undertaken in 1995-1999 by the Tibet Plateau Institute of Biology (TPIB), Lhasa, and the Faculty of Geography, University of Marburg, Germany – extrapolated potential juniper forest cover in the Lhasa region. Average total annual rainfall, based on measurements along two altitudinal transects above Lhasa, indicates that lower slopes are far from the drought limit of juniper trees (250-300 mm/year), and higher slopes (below the upper tree line at 4,800m) receive precipitation comparable to that in well-known forest areas elsewhere in the TAR.

The project – providing evidence of forest potential

To provide experimental evidence of forest potential, juniper saplings were raised from seed collected from the nearest relic stands, and cypresses were raised from seed resources near their actual western distribution limit in Laangxian. The seedlings were cultivated in an experimental nursery in TPIB for one or two years. In 1999 and 2000, plantation trials were undertaken in fenced experimental plots above Lhasa, at between 3,750 and 4,170m in elevation. Saplings were watered in the nursery and at the time of plantation only, and despite the short cultivation period (compared to the minimum of three years recommended for forestry practices) the survival rate of saplings averaged 18% in the 1999 plantation and almost 100% in the 2000 plantation. Now, after two years of growth, these saplings average 60 cm tall.

This experiment indicates a huge potential for afforestation measures on the eroded, semi-desert landscape of southern TAR that could meet the high demand for wood, help combat erosion on overgrazed slopes, and improve degraded pastures.

The future - combining afforestation with rangeland regeneration

Grazing must be excluded from afforestation plots until trees are strong enough to resist trampling and browsing. This method will also give overgrazed rangelands a chance to regenerate. However, the optimum length of rest period varies with altitude, humidity, soil conditions, and degree of degradation. Successional trends observed in exclosure plots established in Lhasa and Reting suggest that in drier climates and/or areas with lower initial herbaceous vegetation cover, longer rest periods will be beneficial for pasture regeneration.

In more humid areas, where dense secondary *Kobresia* pastures grow within the potential forest belt, herbaceous vegetation will regenerate as well, but the quality and resilience of the pasture might decrease over the long term if left ungrazed. For

example, a plot in Reting at 4,625m was fenced in 1997 and revisited in 2001. It exhibited strong regeneration of herbaceous vegetation towards closed ground cover in several layers. The tiny tough sedge, *Kobresia pygmaea*, which dominates vast alpine yak pastures, was overgrown by herbs and taller grasses. This might have a negative effect on the rangeland ecosystem if grazing is excluded for too long.

From these findings have arisen the following important questions for future interdisciplinary research and action in cooperation with local communities.

- Under which conditions are juniper-wooded rangelands sustainable?
- How long do unirrigated juniper plantations need to be protected from grazing?
- How long is protection from grazing beneficial for different types of rangeland?
- How should medium-term rotations of rangeland utilisation, such as fencing materials and herding practices, be realised in different rural communities?

Improved Forage Trials and Grass Seed Development in the Tibet Autonomous Region

Chen Yuxiang¹

Background

The Tibet Autonomous Region (TAR) has a total of 82 million ha of grassland, of which 66% is useable. There are large gaps in productivity in various prefectures of TAR, however, and the edible forage production of Tibetan plateau grasslands is relatively low, at an average 1.04 ton/ha. The productivity of these grasslands is currently decreasing, resulting in conflicts due to the high requirements of livestock. This has been a constraint to the development of Tibetan animal husbandry, especially in northern TAR, which has frequent natural disasters. Nonetheless, animal husbandry accounts for a large portion of Tibetan income.

The current project

The goal of this four-year project was to introduce high-quality forage seeds, both from inside and outside of China, and to test the ecological characteristics and adaptability of various species on the Tibetan plateau in two different ecozones, the riverside agricultural zone at 3600m and the high altitude pastoral rangelands at 4500m. We then planned to select high-yielding species that appeared well adapted to the unique conditions of the plateau and use them both to improve the natural grasslands and to develop cultivated grasslands in TAR. The long-term aim of the project was to enhance local people's ability to withstand disasters and to be a good example for future grassland development projects in TAR.

Project sites were located at Naqu town (4,500m), Danxiong County (4,200m), Danzi County (3,688m), and Quniba Station (3,780m). The Naqu and Danxiong sites are in the purely pastoral regions of northern TAR, whereas Danzi and Quniba are situated in the Lhasa valley near agricultural areas. Testing was conducted on an area of approximately 33 ha at each site.

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We introduced 157 forage species and 15 lawn species to these sites. Of the forage species, 102 species were from China and 55 were foreign; and 50 were legumes, and 107 were graminoids. Of the lawn species, 3 were from China, and 12 were foreign. Overall, 38 species were annual, 2 were biennial, and 132 were perennial.

Results and conclusions

The phenology of plant growth in the different pastures varied according to elevation. In high-elevation pastures, with low temperatures and short growing seasons, plants only grew for a short period of time and became dormant early in the fall. Thus, they could usually not complete their life cycles. Similarly, winter survival rates were high in the Lhasa valley pasture sites, but in northern TAR – especially at elevations above 4,500m such as in Naqu – survival rates were very low. Most graminoids planted in valley sites were able to produce ripe seeds, as were a few legumes. However, in northern TAR, most grasses were unable to complete their life cycles, and only a few species produced seed.

The table below shows the above ground productivity of six grasses tested at three of the four sites.

Site	Production (tonnes/ha)					
	Canada oat	Brazil oat	Denmark oat 444	Qingyong oat 444	Qingyong oat 473	Tama ryegrass (<i>Lolium multiflorum</i>)
Naqu	39.5	35.3	37.7	—	—	—
Danxiong	59.1	56.6	26.2	55.2	27.8	—
Quniba	40.0	35.3	35.3	18.7	18.7	30.0

Plants grew much faster in the valley than they did in northern TAR. For example, most graminoids in the valley grew at least 100 mm per day. However, at the Dangxiong site in northern TAR, Canada oat grew only 10 mm per day, and in Naqu, Brazil oat grew the fastest at 75 mm per day. Although many of the species were able to grow at the study sites, they were not able to produce seed. For example, at the Danxiong site, all species could tassel, but only Brazil oat and Denmark oat produced seed. At the Naqu site, all species could tassel, but none could produce seed. Ripe seed production of species grown in the Lhasa valley was: Canada oat 1.44 t/ha, Brazil oat 2.03 t/ha, Denmark oat 2.15 t/ha, Qingyong oat 444 1.95 t/ha, Qingyong oat 473 2.40 t/ha, and Tama ryegrass 0.75 t/ha. The above ground productivity of some of the annual oat species was 30-70 t/ha. That of foxtail grass (*Alopecurus pratensis*) and sobia (*Sorghum bicolor*) was 3.88 and 29.8 t/ha respectively.

Based on our criteria of growth rate, nutritional value, seed production, and winter survival rate, we chose 29 species that can be successfully grown in these areas of TAR. We also determined suitable planting and cultivation methods for these species at elevations of 3600-4500m. For example, at the Naqu site, we mixed three grass species (Canada oat, Brazil oat, and Denmark oat) with alkaline grass (*Puccinellia* spp.) and achieved favourable production, although these species did not produce seed. Since these species are capable of producing seed under local conditions, the best way to rapidly and effectively improve local grasslands is to establish a self-sufficient TAR seed production centre, with which we can achieve our goals without relying on outside assistance.



Nomads and Markets: Challenges of Decentralised Production – The Case of Yak Cheese

Ethan Goldings¹

Background

Capturing resources under usually harsh conditions, nomadic communities produce rare and often precious commodities. Until now, they have consumed many of these themselves. Today, some herders seek ways to convert some of their assets into cash, both for security in a vulnerable environment and for luxury use. The rangelands of Eastern Tibet have supported communities of relatively wealthy, but comparatively cash poor, nomads for centuries. Although their access to vast lands and their ample assets on the hoof would make them among the wealthiest rural inhabitants of China, their average per capita annual income is in some cases less than \$100 per person per year, which nationally designates them as poverty stricken. This coupled with the increased frequency and intensity of natural disasters in the past decade such as blizzards and epidemics, has caused some nomad families and communities to question their subsistence production and consumption patterns.

Issue – milk product marketing

In the transition from a largely subsistence to a market economy, mobile animal husbandry brings with it unique liabilities and strengths. For the past five years, Trace Foundation has been working with nomads in Kham on projects to produce an export-quality cheese made from the rich milk of the female yak, the 'dri'. The goals of this ongoing programme are to analyse the production and marketing challenges common to mobile animal husbandry communities and to identify solutions that build on their relative strengths. Below is a discussion of the issue of dri milk product marketing in Eastern Tibet.

The milk of free-range dri has twice the protein, butter fat, and minerals of cows' milk. It is superior in many respects to the antibiotic and hormone-laden milks commercially available throughout the world from grain-fed animals. The main challenge facing these nomads has been to convert the summer surplus of this precious renewable resource into cash. The sparse settlement patterns necessitated by low vegetative production have not encouraged great investment in infrastructure, and thus there is virtually none. Without a developed energy and transportation network, there are few opportunities to bring fresh milk to market.

Butter has long been a commodity in local markets. A dried yoghurt product, which the Tibetans call 'chura', is a version of the similar commodity found throughout Central Asia for at least two millennia. Both chura and butter capture some of the summer milk surplus and are convertible at a relatively low cost.

Under the proper conditions, a rennet-based cheese-making process can produce exceptionally high yields of extraordinary quality. The rare flora and fauna combine with the rarified atmosphere of the high plateau to allow for a curing process that produces a product of amazing subtlety and complexity. This cheese can be stored for up to one year, allowing nomads to transport it to market at a time of their

¹ Trace Foundation, New York, USA

choosing, when prices are favourable. It can provide income from a commodity available in surplus – milk – without decreasing traditional uses of milk as butter and chura. Finally, 100 l of milk (were it possible to transport it to market) would sell for the equivalent of only US\$ 50. Converted to 10 kg of cheese, it sells for US\$ 125 at the producer's convenience, and 4 kg of butter can be produced as a by-product.

The organisational challenge facing nomads in this, as in so many of their endeavours, is to deliver this high-quality, value-added product to an appreciative market, and to ensure that the lion's share of the profits flow to the primary producers. The land can only support a limited economy of scale, and there is a danger of upsetting the delicate ecological balance that has been in place for centuries. Also, many nomads lack language, business, marketing, and other skills and networks to bring this or any other product to market for a fair return. A federation of yak cheese producers might give them some collective bargaining power vis a vis flush middlemen, but this level of cooperation is thus far more a dream than a reality.

Many of the conditions creating the uniqueness of the products of mobile animal husbandry also contribute to the challenges of their successful marketing and distribution, if not their production in the first place. If these challenges can be met in such a way that they enable, rather than constrain or undermine, traditional society and culture, then there is hope that the transition from subsistence economy can be made less painful.

Culturally respectful development

'Nor', means both capital and cattle, and so much more, to Tibetans. They see the yak as a blessing or wish-granting gem ('norbu') that makes life as they know it possible under the often brutal conditions of the Tibetan plateau. Moreover, this remarkable animal helps their culture to flourish. They butcher it reluctantly and sparingly and are loath to cull or sell members of their herd. Herd structure and land-use patterns may appear irrational to outsiders but make clear sense to inhabitants. A culturally respectful development plan begins from this point of departure and seeks to extend or build upon these social axioms. To truly help the beneficiaries, it must also be stable, sustainable, and equitable and mitigate any dislocation it causes.



Ecotourism Opportunities for Pastoralists; Experiences from Ladakh and Sikkim, India

Nandita Jain¹

Background

Pastoralists live in remote areas where extremes are the rule. Their lives are harsh, and they are constantly vulnerable. The unique livelihoods of pastoralists are, however, resilient, and these people are rich in many ways. They live in scenically beautiful areas with amazing natural and cultural heritages.

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There are many potential benefits of tourism for pastoralists. Tourism can provide supplemental income and offset losses incurred by traditional economic activities. It can provide opportunities to exchange information and learn about other cultures and livelihoods, and it reduces overall rural-to-urban migration. It is also conducive to the conservation of natural and cultural heritage.

Current project – eco-tourism and home-stays in Ladakh and Sikkim

The mission of The Mountain Institute is to work with local people to meet the unique needs of conservation and equitable development in mountain communities throughout the world.

In May 2001, in Leh, Ladakh, agro-pastoralists, tour operators, non-government organisations, government representatives, teachers, and scientists met together for a workshop. The overall goal was to maintain a balance in the unique cultural, social, and environmental heritage of Ladakh. Specific objectives included conserving the natural and cultural heritage of the area, generating socially and environmentally responsible economic benefits for rural populations, increasing the skill level of eco-tourism service providers, and introducing and influencing policies and schemes benefiting the rural tourism industry.

In Sikkim, surveys were conducted to determine which eco-tourism services local people might consider beneficial. The following is a list of activities that they named:

- Guest house home-stays
- Seasonal wildlife viewing
- Local wildlife guides
- Dissemination of information about the place
- Consumption of local vegetable and dairy products
- Pony operators' union
- Quality, developed campsites
- 'Rebo' (tent) experience
- Grassland management
- Involvement of local youth
- Preservation and conservation of wildlife and habitat

In 2001, a visitor survey, designed by non-government organisations and the private sector and building on previous work in Nepal, was also conducted. There were over 180 respondents, the majority of whom preferred that accommodation be in a traditional village house and that economic benefits flow to the local people. Priority areas for improvement were availability of home-stays, local food, toilets (although most people preferred local ones), and site and wildlife interpretation.

Plans, implementation, and recommendations

As guest house home stays were the most popular option, we focused on that. In 2002, community plans were created, and initial implementation was undertaken. Communities were mobilised around tourism impacts in the National Park. The Khangchendzonga Conservation Committee (KCC) was formed in Yuksam, members of which included farmers, shepherds, pack animal operators, teachers, porters, cooks, and government staff. KCC monitoring activities covered resource use, trails, poaching, and behaviour of visitors and tourism support staff.

We learned several things from the home-stay programmes already existing in Ladakh. For example, the home-stay should reflect traditional styles and ways of life, simple local foods should be served, a minimum capacity of two beds should be available at each home, and the programme should be based on an eco-tourism code of conduct. Training is also required for home-stay owners. This training should cover household management issues, such as cleanliness and cooking and serving of food, and host-guest relations. Guides, pony handlers, and other support service providers require training as well.

We assumed that home-stay owners would be individuals of marginal means and would require basic funds to start their programme. We needed to determine whether or not financial incentives would be required, and if so, why. Potential owners needed to be convinced that this is a beneficial programme, as it will require renovation of their existing homes to accommodate visitors.

Finally, there are several important things to remember when developing an eco-tourism programme with pastoralists.

- Eco-tourism is meant to be a supplementary activity to the existing local economy.
- An incremental, planned, phased approach should be taken.
- Both low-risk and low-investment options should be provided.
- The programme should build on existing assets, including groups and organisations.
- Skills development is required.
- Partnerships are important.
- Finally, don't forget the visitor!!!



Integrated Rural Development in the Tibet Autonomous Region (TAR), China

Nyima Adack¹ and Robert Campbell²

Background

Much of Tibet Poverty Alleviation Fund (TPAF) work takes place in Naqu Prefecture, a pastoral area extending over 20.8 million hectares in north-central Tibet between 4,500 and 4,800m in elevation. Assistance to Naqu began in mid-1998, shortly after the devastating winter of 1997-1998, when snows resulted in a loss of more than one million head of livestock, nearly doubling the number of nomadic people in poverty.

In addition to adverse climatic conditions, long-term degradation of range quality poses a threat to the livelihood and welfare of Naqu's pastoral population. According to the Naqu Prefecture Government, as much as 30% of the rangeland in the prefecture is severely degraded, and degradation processes presently at work are likely to continue unless improved pasture management practices are introduced. Current degradation and desertification processes are believed to be caused by a

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complex combination of factors, including not only global warming and drying of the rangeland, but also social and economic development processes involving settlement of nomadic families in administrative village areas. This settlement, often involving fencing, may be contributing to overgrazing of range areas around winter villages where settlement is taking place.

In response to recent threats to range carrying capacity in Naqu Prefecture, TPAF has launched a number of projects to help determine and demonstrate sustainable range management practices and to improve the quality of nomadic household livelihoods. TPAF's main activities in Naqu Prefecture have included pasture development, village wells, vocational curricula, urban skills training, and micro-finance projects.

Projects

Microfinance in Lhoka and Naqu Prefectures

The main objectives of this micro-finance project were to alleviate poverty in selected sites through integrated social and economic development and to demonstrate to the government the benefits of these approaches, so that they may be replicated in other poverty-stricken areas of TAR. Programmes were to focus on income generation to raise and protect living standards. In addition, building governance structure and local capabilities for sustainable revolving funds in each site was crucial to demonstration of a sustainable and replicable micro-finance model. Different models were expected to be applicable in Lhoka, primarily an agro-pastoral area of south-eastern Tibet, versus Naqu, which is primarily pastoral. Specifically, in nomad areas of Naqu, larger projects and a lack of history of individual responsibility suggested that group loans may be more effective than the individual lending in peer groups likely to succeed in Lhoka.

In the agricultural valleys of Lhoka Prefecture, a micro-finance model was implemented in which RMB 1,000 (US \$121) was lent to women on behalf of their families to be applied to an income-generating activity of their choice. Loans were then monitored by self-chosen peer groups of five. The most popular activity selected was weaving woollen blankets ('nambu'), for which the loan was used as working capital.

In the semi-nomadic plateau of rural Naqu Prefecture, loans were initially made to large groups of households. Loans of RMB 1,000 were thought insufficient for any reasonable income-generating activity; in addition, few nomads were willing to take individual responsibility for a loan, not having any experience with this type of transaction. These loans were mostly used for livestock trading, an extension of traditional activities.

In May of 2000, TPAF began small-scale lending within urban Naqu Municipality, eventually reaching 45 households. Many recipients have started retail operations, either by opening small neighbourhood stores or selling to nomads, or starting up highly profitable guesthouses for long-term migrant workers.

Innovations deemed necessary during the programme included adjustments in repayment schedules, improvements in introductory training, and in rural Naqu, improvements in management structure and reductions in group size. The latter was required essentially because the Naqu model introduced a layer of management into

the lending scheme that was not necessarily well monitored or accountable at a larger scale. As the first round of loans came to an end in 2001, some villagers expressed concerns that delegating management of such large loans to small committees was not wholly effective. There was some dissatisfaction with investment choices and distribution of profits. However, as the nomads had so little experience in income generating activities, it was decided that direct individual lending would be too risky. Therefore, a smaller (five or six households) group approach was agreed upon, and recipient groups formed voluntarily, usually on the basis of living close to one another.

High repayments and high demand for future loans have been preliminary indicators that this is a successful micro-finance programme. There is also anecdotal evidence of an increase in entrepreneurship in some villages, particularly in Lhoka, although this can only be tested as part of a more thorough evaluation – currently a high priority.

Loan repayment rates have been exceptionally high at over 99%. Targeting of households is left to village leaders, who know well the wealth and income landscape in their villages. In Lhoka, loans usually target women from each household. In Naqu, the group loan system makes women's direct participation very rare. In Lhoka, where small groups have been in place since the beginning of the programme, small group meetings have been disappointing; instead of meeting regularly, small groups are informally monitored by their leaders. It is thought that recipients still do not understand how meetings can be useful. In Naqu, the small group system is very new and retains a feeling of hierarchy.

While high repayment rates are pleasing, it may be that TPAF should place less long-term focus on repayment and more on management training of programme officers. TPAF should also resist involvement in dispute resolution, as it could lead to village reliance on outsiders. Further, TPAF continues to rely on outside funding to pay programme officers. Interest payments simply do not cover both costs and salaries. Although most recipients would probably be able to pay higher interest rates, TPAF is precluded from charging anything higher than 3%. Therefore, TPAF will continue to be reliant on new grants to pay overhead expenses.

Pasture development

In April 1998, TPAF launched a project to demonstrate techniques to increase winter forage availability for nomadic families' livestock in 15 villages of Naqu and Nyerong Counties. The assistance included fencing natural winter pasture areas to allow pasture recovery during summer, as well as seeding winter pasture with several native grasses. Fencing of common winter pasture alone resulted in production of an additional 1,871,250 kg of fodder for the 229 poor local families included in the project. This project heightened local interest in large feedlots to maintain livestock weight prior to sale in autumn. However, the experiment also demonstrated that fencing and irrigating near rivers with pumps and small tractors, while effective in promoting regeneration of highly degraded common pasture areas, is still beyond the means of most households.

Water development

Another TPAF project in Naqu was in construction of 14 nomad village wells to reduce human and livestock reliance on polluted surface water for drinking, and thereby greatly reduce the incidence of intestinal diseases and infant mortality. The wells were lined with stone and designed to enable dependable water supplies even during frigid winters. Villagers formed well supervision and maintenance committees, which were trained to supervise well use and undertake simple repairs of the installed hand pumps.

Education

Primary and middle school curricula in Naqu generally lack any vocational content to help prepare youth for the world of work. TPAF is assisting with the implementation of an Education Bureau programme to prepare selected primary and middle school teachers in Naqu and other prefectures to identify local employable skills, develop school curricula to train for those skills, and teach the curricula in their schools. TPAF has been helping train Tibetan trainers, who will in turn train teachers to develop and implement vocational curricula in selected schools.

In Naqu Prefecture, there has been an increasing drift of rural Tibetan youth into Naqu Municipality without the skills needed to secure steady employment. These young people, who have rejected traditional rural nomadic life in favour of urban employment, are an increasing social problem. In order to give these unemployed youths employable skills, TPAF is supporting skills training at Naqu Vocational Training Center.

Rangeland rehabilitation

TPAF is currently implementing a project to demonstrate sustainable range management, recovery, and development practices in selected villages of Naqu's three main ecosystems – alpine meadow, alpine steppe, and desert steppe. Many nomad household surplus fodder production practices introduced earlier in Naqu and Nyerong Counties will be adapted for experimental introduction to these new villages. A central element will be community monitoring and assessment of environmental impacts of winter pasture recovery and development activities. TPAF will also attempt to link microfinancing with rehabilitation work through reciprocal agreements with nomad groups, thus encouraging group investment in rehabilitation costs.

The groundwork for such investment is evident from TPAF's 1998 feedlot development programme, described above, which proved popular in four townships of Naqu and Nyerong Counties. This ongoing programme has provided micro-finance loans to 448 families in ten villages. Loans have generally been for US\$1,200 to US\$6,000, repayable at six-month intervals over two years. Using these loans, many nomad households have chosen to develop fenced feedlots and purchase small tractors to facilitate marketing of livestock and livestock products. Some have also purchased equipment for processing milk products and ground barley ('tsampa') for local consumption.



Where there is No Doctor: Building the Capacity of the Himalayan Amchi to Serve Pastoral Communities

Tenzing Bista¹, Gyatso Bista¹, and Yeshe Choden Lama²

Background and issues faced by amchis

In the pastoral highlands of Nepal, an 'amchi' is very much a doctor – a doctor of multiple skills who provides diagnoses and treatments but who does not have a license to practice. Today, one might find an amchi treating patients in a private clinic in a bustling South Asian metropolis or in a nomad's tent in some remote reach of the Himalaya. Even so, the public perceives traditional medicine as an 'alternative', or a 'last resort'. This is not the case in pastoral communities of the Nepal Himalaya, where an amchi is the only alternative for meeting the health care needs of people as well as livestock.

Motivated by compassion, an amchi devotes his body, speech, and mind to easing the suffering caused by disease. He searches the pastures, forests, and river valleys for medicinal plants and collects the required parts – roots, stems, branches, pith, bark, resin, leaves, flowers, and fruits – to prepare remedies in the form of powders, pills, decoctions, pastes, and concentrates. He also purchases plants and other medicinal ingredients from the lowlands and transports them back to his village.

People living in mountainous areas of Nepal eke out livelihoods in the harsh environment through subsistence farming, animal husbandry, and seasonal trade. In addition to meeting livelihood needs, amchis – who are not compensated for their medical services – face other challenges, such as lack of recognition or support by the government and financial and physical difficulties purchasing medical ingredients.

The growing trade in medicinal plants from the Nepal Himalaya puts pressure on several species and decreases the availability for medicine of key species. This problem is compounded when amchis are unable to access animal parts or endangered medicinal plants protected by law. Livelihood constraints also cause a problem of insufficient training, resulting in incorrect diagnoses and poor quality of medicines. With limited means to purchase medical texts to train new amchis, there is increasing concern about formal transmission of knowledge to younger generations amidst alternative means of livelihood. Even with the recent establishment of schools in the remote districts of Baglung and Mustang, many amchis in Nepal lack access to formal training.

Initiatives to help amchis

This paper examines the role of the amchi in meeting local health care needs and in furthering medicinal plant conservation in the Nepal Himalayas. It describes many current initiatives by and for Himalayan amchis. Below are three examples.

The Himalayan Amchi Association (HAA) was officially registered as a non-government organisation (NGO) in 1998. Based in Kathmandu, HAA enables exchange of knowledge and experience among amchis throughout Nepal and provides a forum for lobbying for recognition and support by the government. The focal points of HAA's

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strategy for promoting the amchi tradition include providing formal training in medical theory, diagnosis, and treatment; improving the quality of medicine produced by amchis; and exchanging information among amchis throughout the Himalaya.

The Lo Kunfen Mentseekhang and School in Lo-Monthang, Mustang was started in 1999 to provide formal education to young amchis, including girls, who wish to pursue medicine. Twenty-one students from Mustang and Dolpa are currently enrolled.

Gangchen Menkhang is a traditional health care centre established in 2000 in Shey Phoksundo National Park, Dolpa, by the amchi of Phoksundo, with support from the WWF-Nepal People and Plants Initiative. A district-level NGO has been registered to manage the centre, which provides health care services to communities inside the park and to students at the nearby Taprizha School, to whom it also provides training in plant identification and use. The health centre also monitors the use of medicinal plants in the area.

The future

Below is a list of several changes that would make the amchis' collective future, as well as the future of the people and natural resources of the Himalayas, much more promising.

- Amchis are actively lobbying for recognition and support by the Ministry of Health. They are interested in establishing a medical school where formal training can be provided, and at which the degrees awarded will be recognised by the government. They also want to be authorised to provide health care services in their communities, since government health posts have not been effective in delivering health care in remote districts of Nepal.
- In China, the amchi tradition has achieved remarkable progress in terms of opportunities for training and practice. Subsequently, there has been a tremendous growth of traditional medical factories, which are sources of income and mitigate amchis' financial problems; however, they have also negatively affected the quality of medicine and ecological sustainability of enterprises. The amchis of Nepal have a unique opportunity to learn from this experience.
- In order to be recognised by the government, amchi medicine must meet requirements for safety and efficacy.
- In the case of rare and endangered species, use of substitutes offers an important option. Many substitutes are already in use in Dolpa and Mustang.
- Amchis' empirical knowledge about the ecology, distribution, biology, and harvesting of medicinal plants is a valuable base upon which to develop guidelines for sustainable use.
- Due to the increasing global trade in medicinal plants and commercialisation of traditional medicine, there is growing concern about the availability of medicinal plants for local health care needs. Although amchis living in urban areas are becoming increasingly removed from the issue of depletion of medicinal plants, those living in mountain areas are very concerned. Many are cultivating species that are rare or that are not available in their districts.
- Younger-generation amchis must be aware of the wider issues confronting their communities. It is no longer enough for amchis to focus only on providing health care. Today, they are confronted with problems of decreasing medicinal resources and must also grapple with the issue of biodiversity conservation.

Towards the Green Belt in Southern Xizang¹

The environmental challenge



Lower Kyi Chu 40 km SW of Lhasa



N-facing flanks along the upper Yarlung Zhangbo



Last residues of juniper shrubs being uprooted in a remote area

The valleys and lower mountain ranges of south-central Tibet have a semi-desert appearance (1). Ancient to recent over-exploitation of the vegetation has caused severe erosion processes and a transformation from the former forest and scrub communities to an open steppe (2). The main result for the local human population is a marked shortage in fuel and construction wood: dung is collected by people as a substitute for fuelwood, which results in a nutrient deficiency on rangelands and fields. The last residues of juniper shrubs (the best firewood and a source of incense) are being uprooted in remote areas along the pass roads (3); in areas where junipers are already extinguished other shrubs are harvested.

Poplar and willow plantations on the valley grounds cover part of the rural demand in construction wood, but they only offer fuelwood of minor quality and need irrigation or a high groundwater table. The dry, non-irrigable mountain slopes are still largely believed to be unsuitable for tree growth.

Project team: Huang Jian, Otsu Tsewang, Tuntsu Tseren, Tu Yanli, Yangchen (Tibet Plateau Institute of Biology, Lhasa), Georg Miehe, Sabine Miehe, Volker Meng, Katja Koch, Kai-Uwe Wollscheid, Armin Schriever (Universities of Marburg and Göttingen, Germany)

Text and photos: G.&S. Miehe, Faculty of Geography, University of Marburg, D-35032 Marburg, Germany; Map: M.Will 2002

Project funds: German Research Council (DFG); Federal Ministry for Economic Co-operation and Development (BMZ), Germany

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http://www.uni-marburg.de/geographie/HPGeo/frames/fr_personal.html

¹ A field trip was arranged to look at the first results of an applied research project aiming at the rehabilitation of degraded rangelands in the area of Lhasa. Sabine Miehe prepared background information on the site and project in the form of a poster - which is reproduced here in full.

The environmental potential



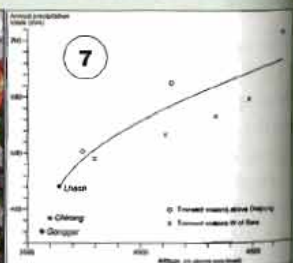
Juniperus/Sabina convallium above Chirong village, c 40km SW of Lhasa

Tree relics on inaccessible cliffs at 4600m above Lhasa

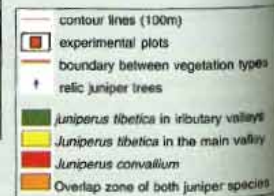
Tree relics on inaccessible cliffs (4) or under religious protection (5) suggest that the area might potentially be forested, at least with junipers. A comprehensive inventory of relic juniper populations undertaken in 1995-99 in collaboration between the Tibet Plateau Institute of Biology (TPIB), Lhasa, and the Faculty of Geography, University of Marburg, Germany, allowed extrapolation of the potential cover of juniper forests in the Lhasa region (6). Annual rainfall totals, averaged from measurements along two altitudinal transects above Lhasa (7) indicate that the lower slopes are far from the drought limit of juniper trees (c 250-300 mm/a) and the higher slopes receive precipitation totals that are comparable to those of well-known forest areas in Xizang. This is still below the upper treeline (c 4800m).



Potential cover of juniper forests in the Lhasa region



Annual rainfall totals along two altitudinal transects above Lhasa



Evidence of the forest potential



Juniper and cypress seedlings cultivated in an experimental nursery in the TPIB

To provide experimental evidence of the forest potential, juniper saplings were raised from seeds collected in the nearest relic stands (5) and cypresses from seed resources near their actual western distribution limit (Laangxian). The seedlings were cultivated in an experimental nursery in the TPIB for 1-2 years (8). In 1999 and 2000 plantation trials were undertaken on fenced experimental plots between 3750 and 4170m above Lhasa. Despite the short cultivation period (at least 3 years recommended for the forestry practice), the survival rate of saplings averaged 18% in the 1999 plantation and almost 100% in the 2000 campaign. The saplings were only watered in the nursery and at the time of plantation. Now they are growing without any supplementary irrigation (9).



Cupressus gigantea, 60 cm tall after 2 years growth with monsoon rains only

Thus, the eroded semi-desert landscape of S Tibet has a huge potential for afforestation measures that could

- a) meet the strong demands for wood
- b) help to combat erosion on overgrazed slopes
- c) improve the degraded pastures.

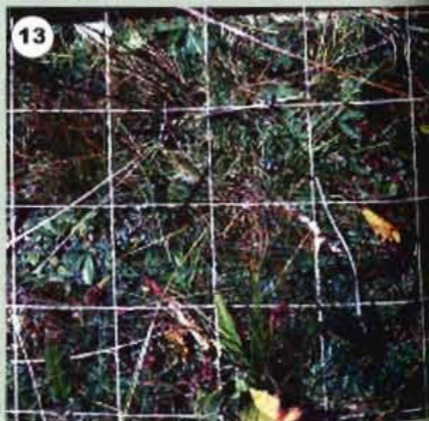
Combining afforestation with rangeland regeneration



Exclosure plots established in Lhasa (left) and Reting (right)

Grazing must be excluded from afforestation plots until the trees are strong enough to resist trampling and browsing. In this way rangelands may regenerate from overgrazing simultaneously. The optimum length of the ungrazed period, however, varies with altitude, humidity, soil conditions and the degree of degradation. Successional trends observed on the exclosure plots established in Lhasa (10) and Reting (11) suggest that the drier the climate and the lower the initial cover degree of the herbaceous vegetation, the longer will the ungrazed period be beneficial for pasture regeneration. In the more humid areas, where dense secondary *Kobresia* pastures grow within the potential forest belt, the herbaceous vegetation will regenerate as well, but the quality and resilience of the pasture might decrease in the long run.

Example: plot 'Reting II', 4625 m, fenced in 1997 (12), revisited in 2001 (13): strong regeneration of the herbaceous vegetation towards a closed ground cover in several layers. The tough and tiny sedge *Kobresia pygmaea*, dominating the vast alpine yak pastures, is overgrown by herbs and taller grasses, which might have negative effects on the rangeland ecosystem if grazing is excluded for too long.



Plot 'Reting II', 4625 m, fenced in 1997 (top), revisited in 2001 (bottom)

Issues for future research and action

The main issues for future inter-disciplinary research and action in cooperation with the local communities are:

- Under which conditions are juniper-wooded rangelands sustainable?
- How long do unirrigated juniper plantations need to be protected from grazing?
- How long is protection from grazing beneficial for which type of rangeland?
- How can we realise medium-term rotations of rangeland utilisation (fencing materials, herding practices...) in different rural communities?