guzzler taxes on fuel inefficient automobiles and effluent taxes charged to polluters were radical departures when they were imposed. Whatever form the next farm bill takes, it had better answer this important question: How many more times do we have to fund conservation reserve-type programs before we treat problem causes and not the symptoms?

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A story about India's rangeland

Mr. Bansi Dahr "One Man Among Millions"

Dennis R. Phillippi

In India, the Department of Soil Conservation is set up by local area districts or directorates. The northern directorate covers the Jammu and Kashmir Districts. Organizationally, the district is headed by a director who supervises and coordinates the work of several technical scientists. This is where Bansi Dahr lives and works.

Bansi Dhar began working for India's Department of Soil Conservation in 1967. Since about 1971 he has worked with and studied the nomadic and seminomadic movements of the "herdsmen" to the summer pastures and between mountain ranges and narrow valleys of the Himalayas.

According to Bansi, about 1/2 million nomads move 4 million sheep, cattle, goats, and some buffalo from the low subtropical winter range to the high mountain alpine summer pastures and back each year. Although the nomads traditionally use the government forest land, they are required to pay a grazing tax. Nomads winter the livestock in the subtropical zone of Jammu (Novem-

Mr. Bansi Dahr discussing routes of the Nomadic herders near Aru Kashmir, India.
Photo by Dennis Phillippi

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ber through March), move the herds through the temperate zones including passing through the Kasmir Val-ley (limited to 10 days), up the slopes to reach the alpine pastures by July, remain there until August or September, and start the descent toward the winter range in September and October. Herd boys are often hired to watch and care for the animals during the year. One boy can care for about 2,000 sheep or their equivalent of other livestock and is paid 100 to 200 Rs/year (approximately $15.00).

While in India in November 1988 I had the opportunity to travel with Bansi Dahr to three areas where his influence and guidance is changing the attitudes of people toward range conservation. In Northern India, the first area visited was the mountain grassland development demonstration near Aru, 11 km north of Pahalgam, Kashmir, India. The elevation at the demonstration site is about 2,500m, soils are loamy, and precipitation is about 600 mm. The project was set up to demonstrate the value of grazing deferment and the introduction of other forages.

Progress is impressive and the concepts are being extended to the nomadic herdsmen through the efforts of Bansi Dhar and others working on the project. Bansi says that change has not come easy. He related the story of obtaining confidence of the nomadic people before convincing them of the value of the demonstration. One of the nomad women brought her young child and threw him on the ground at Bansi's feet and said she would kill the child if he persisted in putting in the demonstration plots. Eventually, a Moslem priest took the "Holy Book" and Bansi took an oath promising that the demonstration project "would not ruin their forage supplies." The first attempt in erecting a fence to enclose the demonstration plot ended in destruction. The posts were pulled up, piled, and burned and the wire rolled up and thrown down a gulley. Finally, the exclosure fence was erected by the Soil Conservation workers at the project. The long hard effort finally paid off and the project is now testing a variety of forages and demonstrating the value of range management.

Besides the forage improvement demonstrations, the Department of Soil Conservation helped build shelters for the nomads in the high country and helped stabilize the treacherous mountain routes—road or path construction. Bansi said that herdsmen had to carry their livestock on their backs to get the animals safely across some of the deep ravines and narrow trails on the mountains.

The second area we visited was the Karewas project located about 60 km west of Srinagar near Armintar at an elevation of 1,900m. The Department of Soil Conservation initiated the project in 1980 with forage introductions in 1981. Nearly three feet of snow covers the ground at the study location each winter. Forage introductions and native species were planted on terraces along the hillside with four replications or blocks. Species being tested are:

Grasses:	**Legumes:**
Phalaris tubroso Harding grass	*Coronilla varia* Crown vetch
Festuca arundinacea Tall fescue	*Trifolium ambigum*
F. rubra Red fescue	*T. pratense* Red clover
Bromes innermis Browse grass	*Melilotus officinalis* Yellow sweet clover
B. uniloides Prairie grass	*Onobrychis viciafolia* Sanfoin
Agrostis spp. Bent grass	*Medicago sativa* Lucerne
Dactylis glomerata Orchard grass	*Vigna sinensis* Cowpeas
Phleum pratense Timothy	*Lotus padanculatur* Birdsfoot trefoil

Also planted on the study area hillside are poplar trees *(Populus ciliata).* Several other species identified in the area were astragalus *(Astragalus grahimionus)* and a mint *(Sativa thyma).*

Ecologically, heavy grazing usually converts the bunchgrasses into sod forming grasses such as bermuda grass *(Cynodon dactylon).* Following sufficient rest from grazing, the grasses will proceed in succession to bluestems (*Bothriocloa* spp.) and other bunchgrasses *(Chrysopogon fulvus).*

According to Bansi, harding grass *(Phalaria tubroso)* was much easier for acceptance from the livestock owners, especially the nomads, because it grows taller than the red fescues *(Festuca rubra),* even though the latter would be nutritionally superior.

Several varieties and/or genetic variations were being tested for some of the species listed above. For instance, *Trifolium ambigum* plantings are made for the typical variety and the diploid and tetraploid genotypes. Native grasses prevalent on the area were bristle grass *(Setaria viridis)* and bluestem *(Bothriocloa petusa).*

In the low, subtropical winter range, several fodder shrubs and grasses have been planted such as lantana (*Lantana* spp.), woody legumes (*Acacia* spp.), and bristle grass (*Setaria* spp.). On the temperate mountain ranges, grasses (*Oryzopsis* spp.), fodder shrubs *(Indigofera gerardiana),* and herbaceous legumes such as white clover *(Trifolium repens),* have been established in an effort to provide additional forage.

Soil Conservation in Rangil Watershed

The third area we visited was the Rangil project located about 15 km north of Srinagar on south facing slopes overlooking Kashmir Valley. Forest regeneration started in 1981 with the planting of black locust *(Robbinia pseudoaccocia)* in rows along terraces with 1.5 m × 2 m spacings. Three years later, conifers, mainly *Cedrus deodara,* blue pine *(P. walichiana),* and junipers (*Juniperus* spp.), were planted between the black locust rows. Centerious (*Ailanthus* spp.) was planted on the hillside.

Grazing was prohibited from the watershed rehabilitation and forest regeneration project from time of initiation. However, hand harvest collections of the forage may be permitted in the future. The waste of forage on these areas is criticized by some of the local community people; however, the "locals" recognize the forage yields have been increased and soil erosion had decreased because of the increase in plant cover.

Prior to the project the grass cover was very sparse with sod

forming bermudas and *Chrysopogon echinulatus* predominating. However, after seven years, good establishment of *Pennisetum* spp., a mid-successional grass, was noted over the hillside. Also, *Themeda anathera* considered the highest-successional grass in that area was scattered throughout the watershed.

The accomplishments of Bansi Dahr's efforts are impressive.

Reflections

Tremendous opportunities exist for technical assistance in soil, range, and forest conservation in developing countries. The work of India's Directorate of Soil Conservation serves as an excellent example of what can be accomplished.

Dahr is "one man among millions" in a land where civilization has existed for several thousand years and where rangelands have deteriorated beyond one's imagination. The constraints for Bansi are different than what North America faces. Our limitations are mostly what we place on ourselves, our group, agency, etc. North Americans are blessed with an abundance of resources. In developing, tired and used countries, the constraints to resource improvement are cultural, religious, political and, of course, financial, not technical, as one might expect. When working with developing countries, it is important to determine if they need, or even want, high tech or sophisticated research to solve their resource problems. Instead, they may need just solid common sense, grassroot level recommendations, and demonstrations that will fit their way of life. The Chinese proverb "Give a man a fish and he will have a fish for a day. Teach a man to fish and he will have fish for many days" could apply to the United States involvement in developing countries—especially in the area of resource management. Bansi Dahr is being accepted because he works at the grass roots level.

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Riparian Zone Inventory

Sandra Braasch and George W. Tanner

Riparian zone management is receiving increased attention on all rangelands. These areas are important for protecting stream habitat and maintaining water quality. The riparian zones are important livestock grazing areas because of accessibility to succulent forage, gentle topography, availability of water, and generally abundant shade which provides temperature relief. Lack of streamside vegetation exposes banks to erosion from rain or running surface water.

Concern has been shown in recent years about the impacts of improper grazing management on riparian and stream ecosystems. Problems frequently attributed to grazing include (1) vegetation deterioration in the riparian zone, (2) streambank destruction, (3) shallower and wider streams, (4) higher stream-water temperature, (5) sediment-covered stream bottoms, and (6) deterioration of fish habitat and population levels (Busby 1979).

During the summer of 1987, a channel stability evaluation system (Pfankuch 1987) and plant habitat classification system (Johnston 1982) were used to study and evaluate the riparian zone along a creek in the Rio Grande National Forest in Conejos County, Colorado (Fig. 1). The Pfankuch channel stability and plant habitat classification system are procedures which can be used to both establish baseline conditions and to monitor riparian zone and stream responses to range management practices. These studies: (1) evaluated the capacity of mountain stream channels to resist detachment of bed and

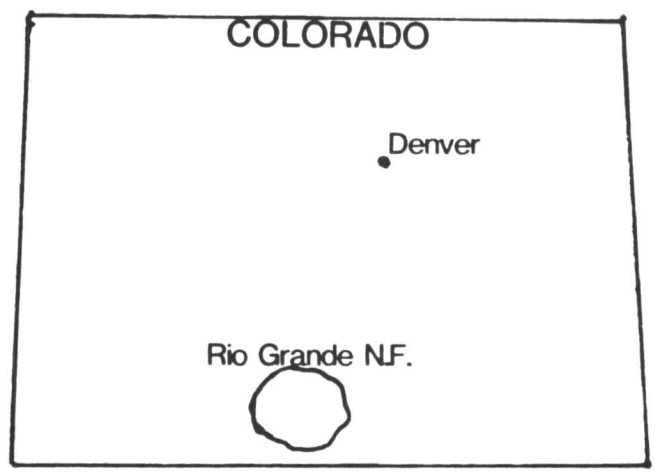

Fig. 1. *Location of Rio Grande National Forest, Conejos County, Colorado.*

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