agenda

November 1978
Vol. 1, No. 10

DEVELOPMENT CLOSE-UP

Contents

november 1978

Agenda is available without cost to persons who request to be placed on the mailing list. Readers are invited to submit original manuscripts (including speeches) and photographs on any aspect of international development. Such material cannot be returned unless accompanied by a stamped, self-addressed envelope of sufficient size and strength.

John J. Gilligan, Administrator
James W. McCulla, Director
Office of Public Affairs
Press and Publications Division
Office of Public Affairs
Agency for International Development
Washington, D.C. 20523
(202) 632-8639

Edward R. Caplan, Division Chief

Laura L. Kreuzer, Editor

NEW HOPE THROUGH SELF-HELP

Twentieth Century Pioneers

By
John Metelsky
AID Public AffairsOfficer

Armed with a sharp machete, Eduardo Candia, a Quechua Indian, moves through the dense green jungle stalking an armadillo.

The armadillo would mean fresh meat. His wife, Ceverenia, would roast it over the open fire and serve it with rice, broad beans and hot peppers.

Candia knows the jungle well. Pausing a moment, he wipes the sweat from his face with his forearm.

Suddenly, La Blanca, his hunting dog, begins barking as the armadillo scrambles into its cave. A six-foot bushmaster snake glides quickly out of another cave opening and strikes the dog.

Before La Blanca can react, the snake bites her three times. It then strikes at Candia. Candia swings his machete at the snake again and again. Finally, the snake lies dead.

Trembling slightly, Candia stuffs the dead bushmaster into a large burlap sack. He slings the sack over his shoulder and trudges home.

He and his wife skin the snake and cook and eat it. "It was delicious," Candia said. "Better than armadillo."

La Blanca was sick for five days, then slowly recovered. "Now she is as strong as ever," he smiled.

Eduardo Candia and his family.

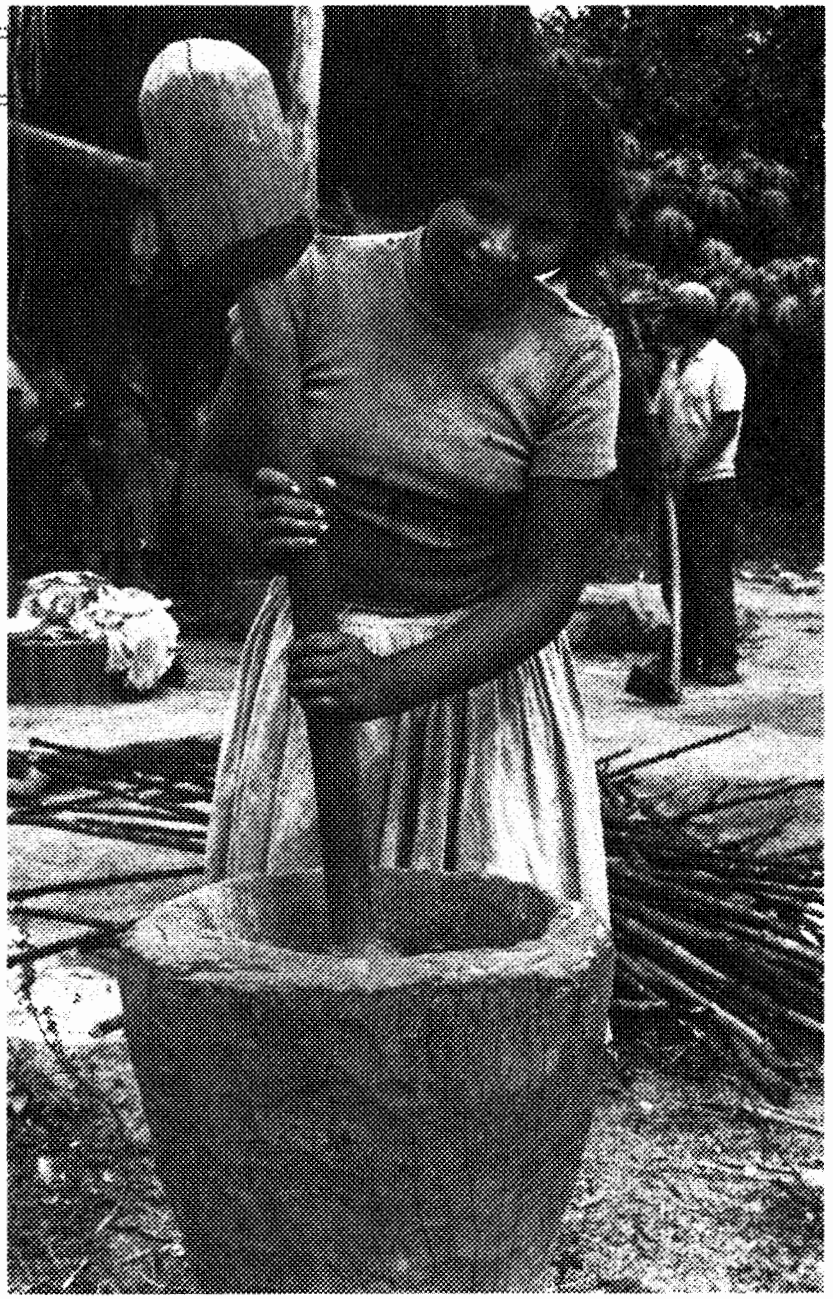
Candia is a 20th Century pioneer. Six years ago his life changed drastically. He and his family left their altiplano home in Bolivia's highlands to find a better life in the colony of San Julian in the tropical lowlands. Located in the jungle about 75 miles north of the city of Santa Cruz, San Julian consists of 200,000 hectares (about 500,000 acres) of heavy subtropical scrub brush mixed with broadleafed trees no taller than 40 feet.

About 85 percent of Bolivia's rural population lives in the mineral rich highlands — even though this area contains only about a third of the country's land. The lowlands near Santa Cruz have a small population and large tracts of fertile land where farmers can grow crops year 'round. The Bolivian government is promoting colonization of the lowlands as part of its program to provide land to small farmers and reduce its dependence on mining.

The San Julian colonization project is funded by $ 5.1 million from the Bolivian government and a $9.7 million loan from the U.S. Agency for International Development. Most of the AID funds are used to build roads and trails through the jungle.

Frank Kimball, director of AID's mission in Bolivia, explained that the AID project will build a 100-kilometer all-weather road, 800 kilometers of dry-weather acess trails, and an 80-kilometer penetration road between San Juan and the Chane Independencia area.

AID has financed the purchase of nine tractors, well-drilling equipment, a maintenance shop, a mobile health unit and pre-fabricated metal buildings. The funds will pay for an agricultural service center to provide settlers with technical assistance and credit, 200 water wells, a health post and an orientation program.



Eduarda Candia, age 12, pounds corn kernels for the family's dinner.

Bastiaan Schouten, an AID rural development officer, outlined the colonization program: "Each family gets 50 hectares of jungle. Although they pay a token fee for the land, basically it is given to them. But they have to prove that they will be permanent settlers.

"Fifty hectares is too much for one family to farm. But, as is the custom in Bolivia, the father divides his land among his sons, and the sons divide the land among their sons. In a few generations, most of the 50 hectares could be productive farmland."

In the first three or four years, the family clears — with machete and axe — three or four hectares for cultivation. The wife cooks and cares for her four or five children and helps in the fields.

Candia was one of the first colonists to settle in San Julian. He and 19 other Quechua Indian colonists from the Bolivian altiplano arrived in 1972. "Nature forced me to come to the jungle," Candia explained. "I was a potato farmer in the Cochabamba highlands. My father had land he received after the agrarian reform in 1953. It was good land. We grew potatoes and were doing pretty well."

One year, Candia decided to increase his potato production by using more fertilizer. With a loan from the Bolivian AgriBank, he bought 3,800 pounds of fertilizer. Candia shook his head and said, "But that year a strong fungus disease attacked the potatoes. Everybody lost their potato crop."

To pay back the loan, Candia sold his oxen and all his farm animals. "We lost everything," he said, putting his arm around his wife. "We had no choice. We had to come here."

When Candia came to San Julian, he was apprehensive. "Fifty hectares of jungle will frighten any man. Clearing land is hard work, but it is our land. I am strong and healthy. I have a good wife and six fine children. We all work together."

He and his family live near the

main penetration road. "The road is very important," Candia said, "because we can get our crops to the market in Santa Cruz without paying high transportation costs."

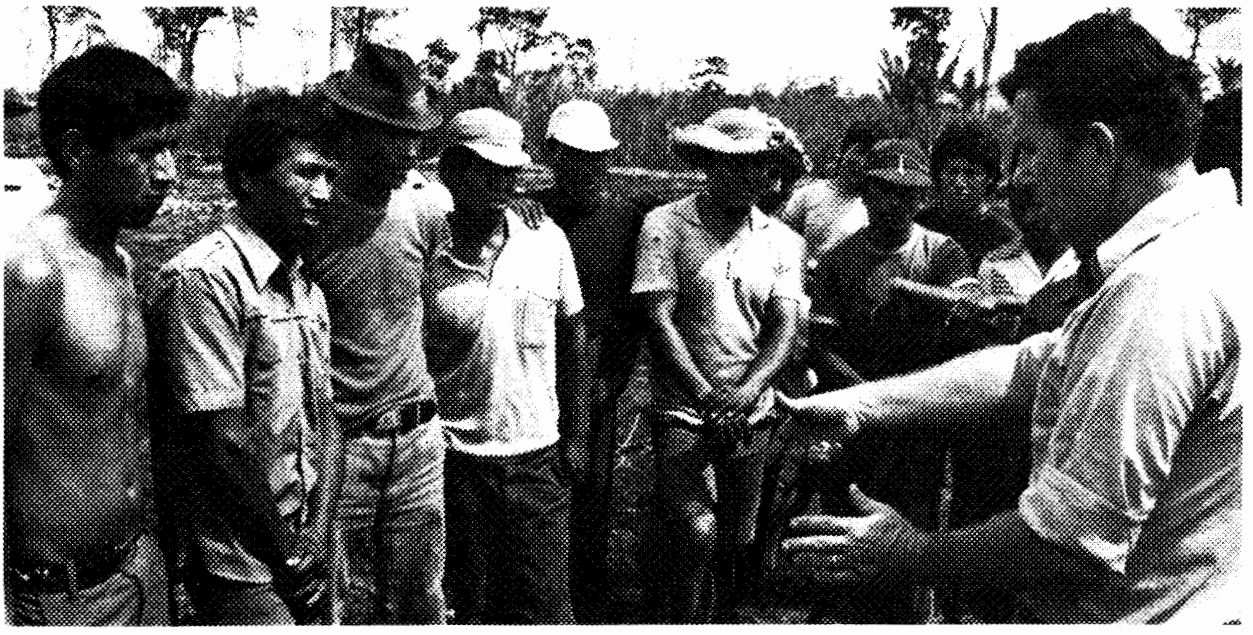
Although Candia was an experienced potato farmer, he had no knowledge of tropical agriculture. "I didn't know how to grow rice or tropical fruits and vegetables," he recalled. "But I learned fast. The United Church Group showed us many things." The United Church Group made an agreement with the Bolivian National Institute of Colonization to establish an orientation program for the new settlers. The group consists of Methodist, Mennonite and Catholic volunteers.

The orientation program offers instruction in nutrition, basic sanitation, building construction and tropical farming. The group also helps the settlers develop community cooperation, make decisions and form their own community government.

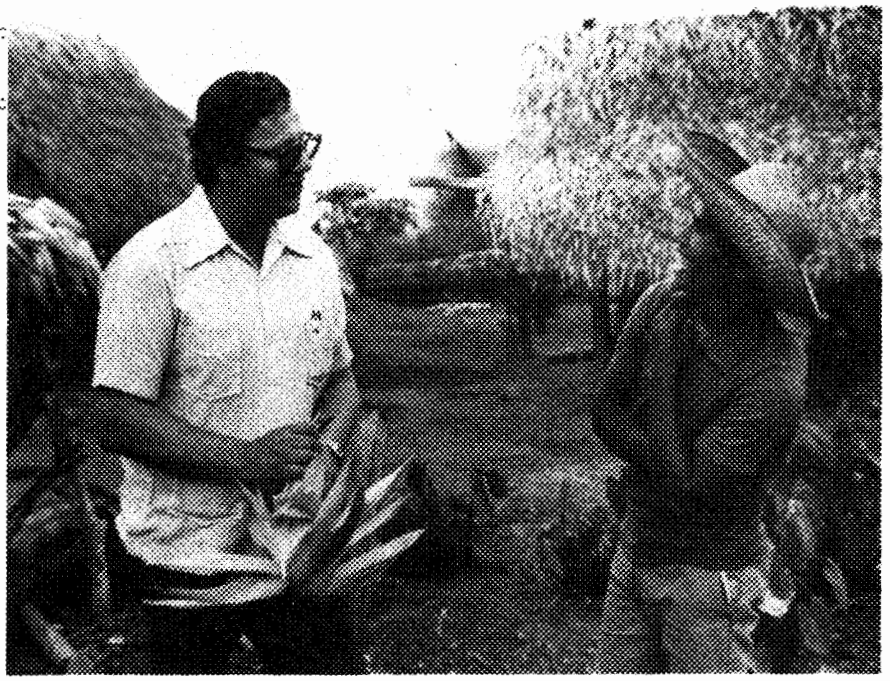
When colonists arrive they build temporary housing, clear one hectare, plant subsistence crops and organize their community. This usually takes four months.

Harry Peacock, now an advisor to AID on the colonization project, was an early volunteer with the church group. He recalled Candia's arrival. "Working with the church group, the older colonists and people from the lowlands taught Candia and other new settlers how to use and sharpen machetes. We showed them how to

Two of Eduardo Candia's children lunch on rice and beans.



AID Consultant Harry Peacock explains the new farming techniques to San Julian colonists.



AID rural development officer Bastiaan Schouten discusses crops with colonist Mario Mamani.

chop down trees with axes and how to select trees to use for axe handles. We taught them tropical gardening—how to grow tomatoes, lettuce and cabbage. Most of the settlers had only grown potatoes and beans. Some grew corn—but a different variety. The new settlers learned to grow some types of potatoes in the lowlands, but they are not as good as the highlands potatoes."

As part of the orientation program, the families learn about good nutrition. Peacock explained, "In the lowlands, family gardens contain beans, rice, corn, tomatoes, bananas, papaya, peanuts and soybeans. The colonists eat lemons, oranges and other tropical fruit. For protein, they eat armadillos, wild pigs, alligators, snakes, certain birds, and coatimundis (South American mammals resembling raccoons)."

"That first year," Candia said, "my family and I cleared one hectare of land. Since my children were small, my wife and I did most of the work. First we cleared the undergrowth and small trees with machetes, then we cut the bigger trees with chain saws."

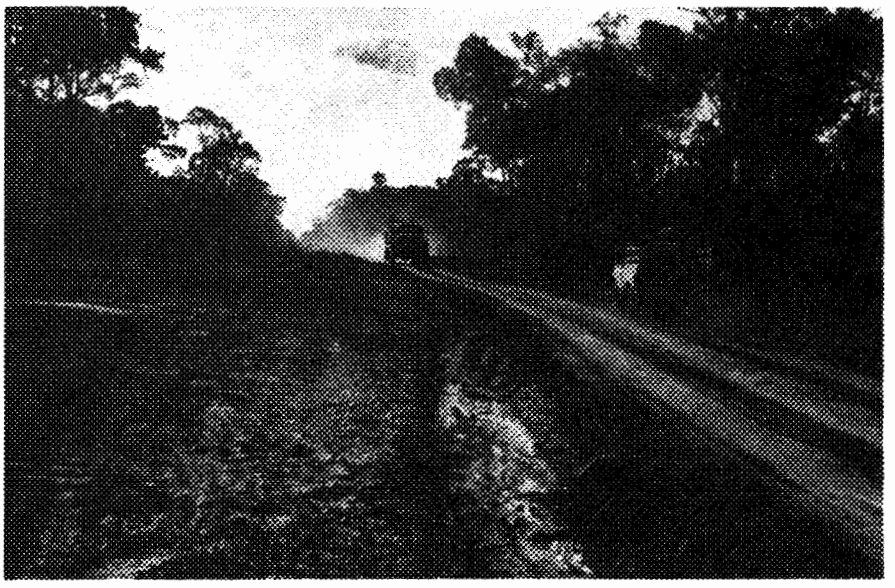
The church group selected Candia to learn how to operate the chain saw. "It was very hard work, but all the colonists worked together. We helped each other." For 40 days, Candia and two other colonists used the chain saw to clear the land of large trees. They divided the land into 50-hectare plots for the 20 families. The next year 20 more families arrived.

The plots of land are shaped like pie wedges. The land radiates out from the village center like spokes on a wheel. The settlers build their houses of bamboo, wood and thatch near the village well. Later, some farmers make adobe houses with concrete floors.

The Candias have cleared 14 hectares. They want to plant more fruit trees and become less dependent on the three varieties of rice, two varieties of corn, beans, tomatoes and other vegetables they now grow as annual crops. They also have five pigs. Last year they had 30 but sold them, because the price of pig feed was high. Candia wants to go into hog production and put in pastures and fences if he can get credit from the agricultural service center for the project.

Reflecting on his years of hard work as a new settler, Candia said: "The life here is very hard. The food is different, and the weather is hot. Mosquitoes and other insects bite us all the time. We all had to get injections for yellow fever and malaria. We work all the time.

"We have come here to have our own land. Our children will have a better life. When they get older, I will give them their own land. Although this life is hard, it is better than the life we had in the highlands. This is our home. We plan to stay here the rest of our lives."



Trucks travel the AID-financed penetration road into San Julian.

NEW HOPE THROUGH SELF-HELP
Partners in Education

Robbie Pope washed dishes and mowed lawns.

Sabrina Searle cleaned house.

Piper Leon helped organize a hayride and a carnival.

These 12-year-old students at East Sandy Elementary School in Salt Lake City, Utah, donated $1,000 to help build East Sandy School of Chahuira Pampa, high in the Bolivian Andes.

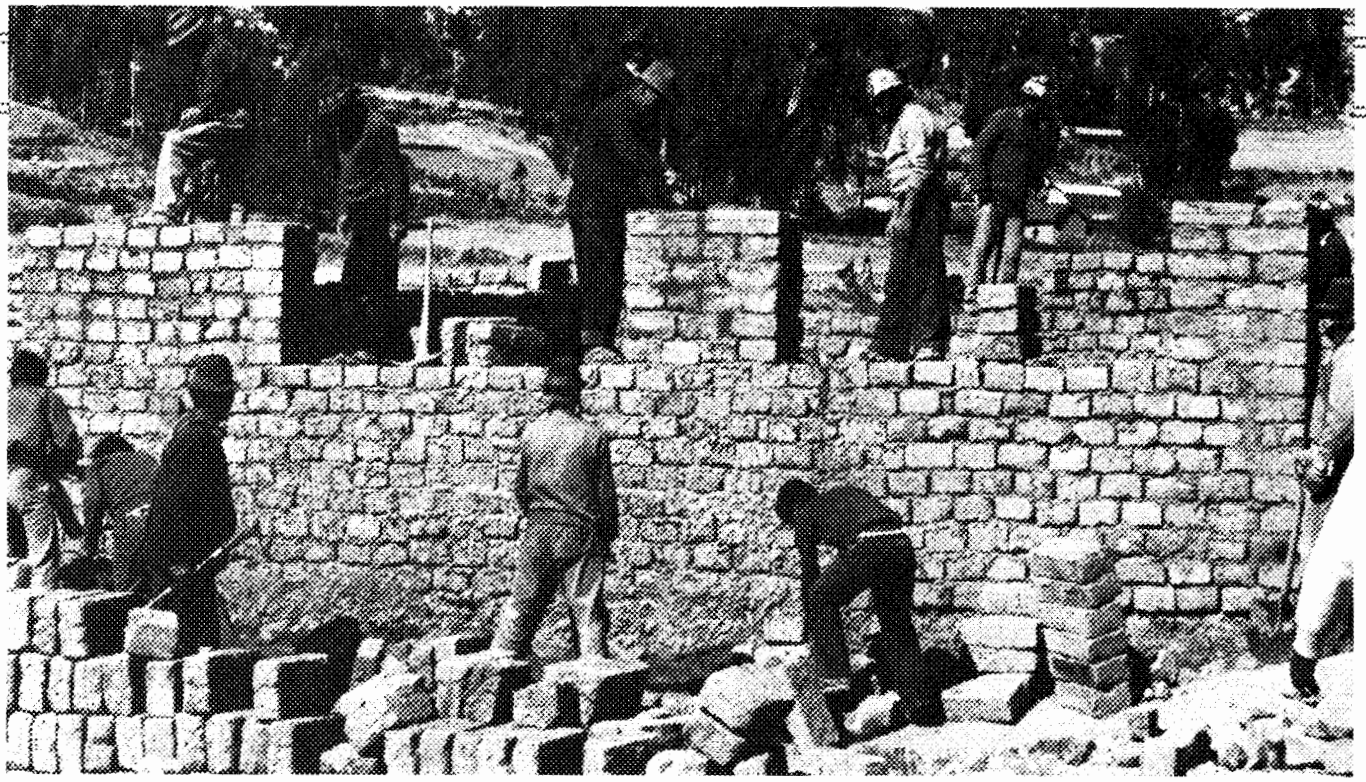
The Salt Lake City and Bolivian students are linked by the Utah-Bolivia Partners program of the Partners of the Americas. This people-to-people program helps Latin Americans help themselves in education, health, agriculture, rural development, cultural arts and sports.

Bolivia is the poorest country in South America and the Aymaras in the altiplano, descendants of the Incas, are among the poorest in the country. Worn-out soil, high altitude and harsh climate make their life hard. The campesinos (small farmers) subsist by growing potatoes, barley, quinoa, corn and what other crops they can on their wind-swept Andean plateau.

For more than 10 years, the Utah-Bolivia partners and the Utah children have been building schools in the altiplano.

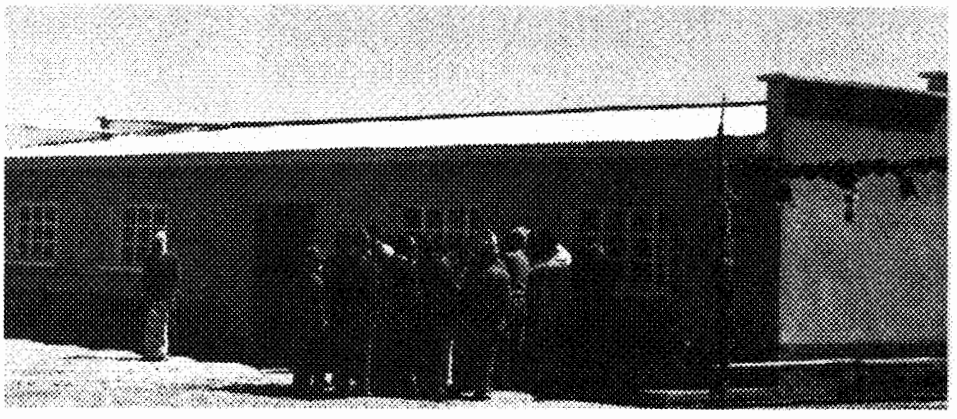
The Chahuira Pampa School complements the Bolivian government's plan to improve rural education for one million children. Since 1971, only 31 percent finish five grades, and fewer than one percent enroll in secondary school. Of Bolivia's total population over 15 years old, 60 percent cannot read or write. The school children of Utah and the Partners are helping to bring basic education to the Aymaras.

"This is the biggest thing that ever happened in this village," exclaimed Ray McAllister (right) shown chatting with some of the new school's students. McAllister, a graduate student at Brigham Young University, is a community education intern with the Utah-Bolivia Partners. "The Aymaras donated the land and their labor," McAllister explained. "They also contributed $100 cash — a sizeable donation from a poor village where the average campesino earns about $100 a year."

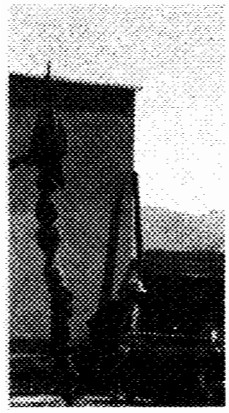


"Just about every able-bodied man and woman in the village — about 75 Aymaras — worked on the school," McAllister said. "Building a school by hand is hard, backbreaking work, particularly under a blazing sun. Everyone worked together and there was work for everyone. The men — and women with their babies strapped on their backs — made adobe bricks, mixed cement, unloaded trucks, swung picks and shovels, dug holes and cleared the land. The younger boys and girls tended farm animals — llamas, sheep, goats and pigs — so their parents could work on the school. Tiny children pumped water from the well and carried it to their parents. There was a strong community spirit involved in building the school, and the Aymaras take great pride in their work."

The new school is the result of a three-way cooperative effort to build elementary schools in the Bolivian highlands. The Utah children raise money — usually about $1,000 per school — which pays for cement, metal roofing, plaster, lime, wire and wood for doors and window frames. The Aymaras donate land, labor and



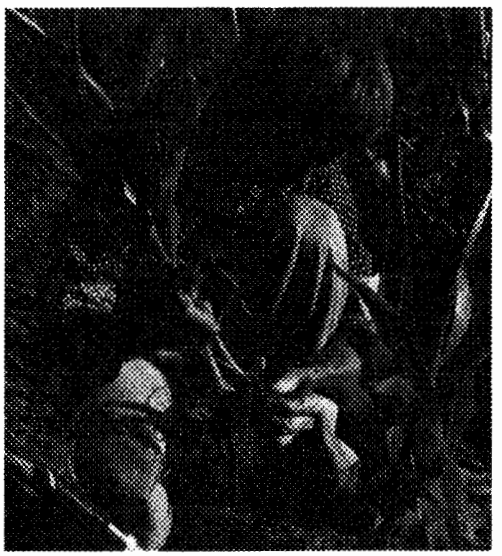
The new school was properly opened with a fiesta of celebration. The Aymaras, in traditional costumes and masks, danced to bring good luck to the school. Proud parents and children crowded into the two classrooms and admired the concrete floors, the large windows, plaster walls, and blackboard. During the festivities, Pedro Layme Huallpa, president of Chahuira Pampa Community Council, sent a special message to the East Sandy Students in Utah: "On behalf of the Community Council, the teachers, the students and the mothers and fathers of students now in school and on behalf of the mothers and fathers who will some day have children in our beautiful school, we send our deep love and appreciation to the fine boys and girls of East Sandy Elementary School in the beautiful state of Utah who worked so hard to give us the money for our new school. It was a wonderful thing for children in a far away land to send the money."



some basic building materials, such as adobe bricks. The Bolivian government provides a teacher for every classroom. In addition to serving as a school for the children, the building will be used after regular classes for adult literacy programs, vocational training, village meetings and nutrition classes.

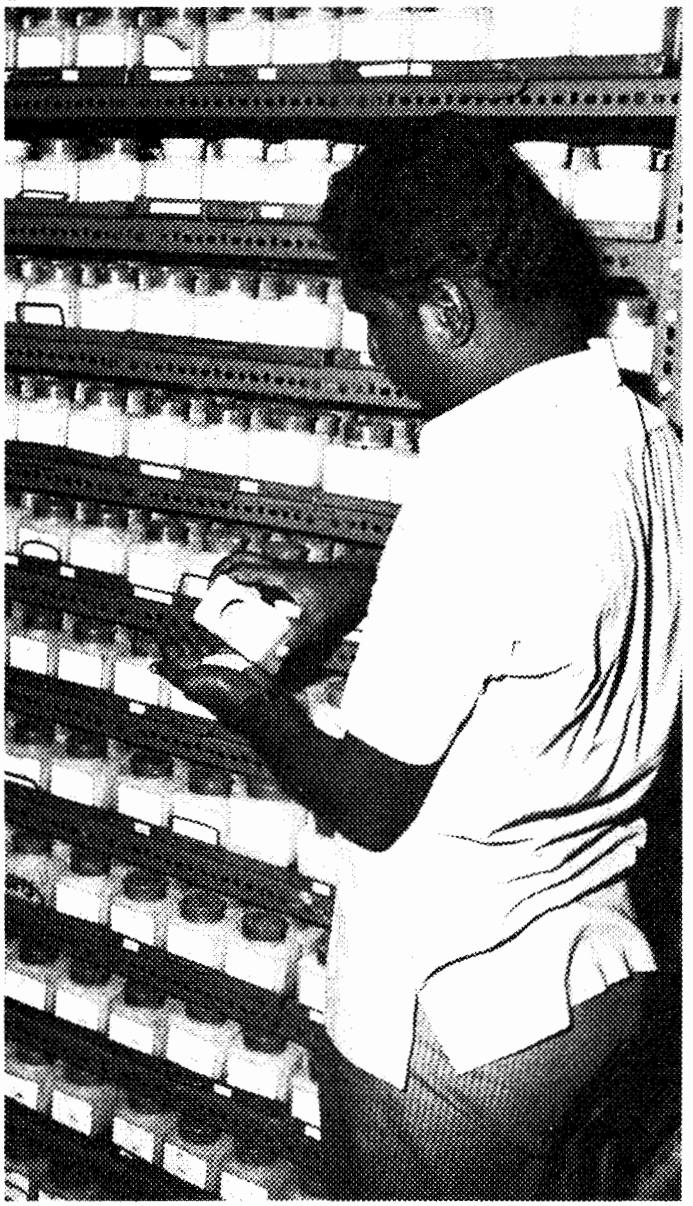
The Aymara parents see the new school as their children's hope for a better life. One husky man, pointing to his rough, calloused hands, said, "Making the school was hard work, but it is a good thing. This strong building will last for many years. My children and my grandchildren will learn to read and write in this wonderful school. Maybe they will have a better life than me and my wife."

Improving the People's Crops



A

B



Scientists at ICRISAT (International Crops Research Institute for Semi-Arid Tropics) are seeking ways to bring a "Green Revolution" to the subsistence crops of the world's poor.

This article is by Jerry Rosenthal, chief of Press and Publications in AID's Office of Public Affairs until he retired in 1977. It is adapted from an article in The Christian Science Monitor,

A Microbiologist Peter Dart checks a sorghum plant. The Institute is working on improving this cereal grain which is a staple food in the developing nations.

B This germplasm bank is part of the Institute's collection of plant varieties gathered from around the world. By combining qualities from different strains, scientists hope to find acceptable varieties with higher yields.

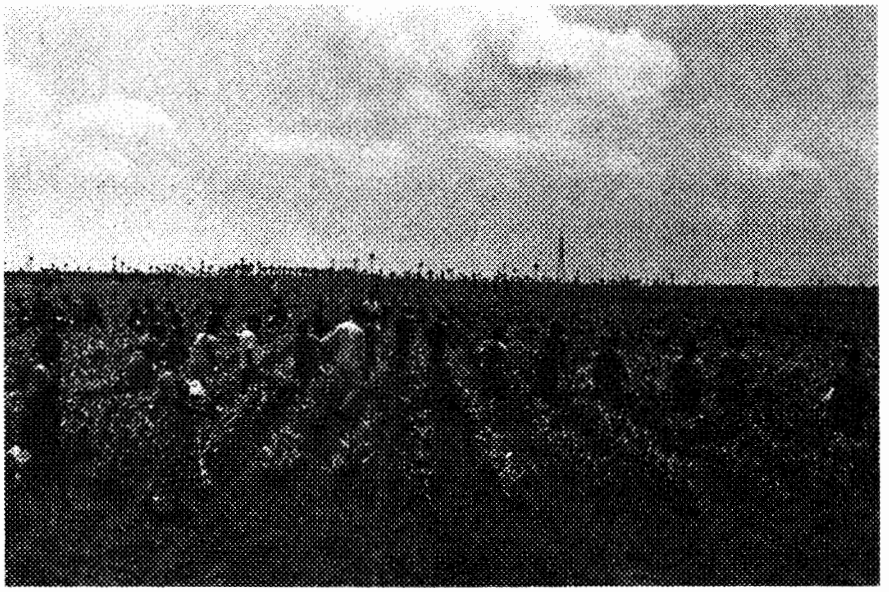
Exploring India's exotic forests and hills to collect a handful of seeds may not seem worth the discomfort, time and effort. But to Dr. L. J. G. van der Maesen, a young Dutch botanist, and his fellow scientists at a research institute called ICRISAT, the study of plants such as pigeonpeas, chickpeas, sorghum and millet is exciting and vital.

These crops feed, inadequately, the world's hungriest people — the 500 million poor who live in drought-prone Ethiopia and Africa's Sahel; Brazil's Northeast; the crowded southern states of India and other Asian nations; parts of the Middle East and Mexico, and numerous islands.

ICRISAT — the International Crops Research Institute for Semi-Arid Tropics — was established in India in 1972. Its mission is to improve the quantity and quality of crops that can be grown in marginal land; to develop ways to stabilize and increase food production through improved farming practices; to determine the social and economic factors that affect agricultural change, and to provide assistance to regional and national agricultural programs. The long-range objective is to help the people of the semi-arid tropics achieve a better life.

For Dr. Leslie D. Swindale, the articulate, intense New Zealander who directs ICRISAT, survival is the challenge. "We are dealing with farmers whose crops are their life," he says. "If the crops fail, they starve."

ICRISAT is part of a world wide network of agricultural research centers. Two of its sister institutions are the prestigious twin birthplaces of the Green Revolution — the International Rice Research Institute (IRRI) in the Philippines, home of the "miracle" rice that has multiplied the yields of millions of Asian paddies, and the International Maize and Wheat Improvement Center (CIMMYT) in Mexico, where Norman Borlaug led the development of high-yielding wheat, an achievement that won him a Nobel Peace Prize. Two other institutions, in Nigeria and Colombia, concentrate on tropical crops. There is a potato research center in Peru, an animal health laboratory in Kenya, a livestock center for Africa in Ethiopia and a dry area center in Lebanon and Syria. The Consultative Group on International Agricultural Research (CGIAR) is the umbrella organization that coordinates the work of ICRISAT and the other eight centers. It also supports the work of several groups specializing in plant genetics and West Africa rice.



Fertilizer application in one of the crop improvement fields.

At home and abroad, geneticists, entomologists, agronomists, economists, anthropologists and other scientists are working to produce more and better wheat, corn, rice, beans, sorghum, millet, yams, cassava, chickpeas, pigeonpeas, cowpeas, potatoes, peanuts, livestock, poultry, and fish.

ICRISAT's assignment is urgent. "Our job," says Swindale, "is to help the poorest segment of humanity. We must concentrate on subsistence crops, those that are the least known and studied, the ones the Green Revolution never touched."

ICRISAT's labors are aimed at the least advantaged, least literate and most tradition-bound farmers, and the institute's home is in the country that has the most at stake — India.

Its professional staff includes scientists and technicians from every continent. The entire work force — professionals, consultants, technicians, skilled and unskilled labor — ranges in size from 750 to 1500, depending on the season. Financial support comes from AID (25 percent), Australia, Belgium, Canada, West Germany, Netherlands, Norway, Saudi Arabia, Sweden, Switzerland, United Kingdom, U.N. Environmental Program and the European Economic Community.

India, with almost half of its people subsisting on semi-arid land, sees ICRISAT as a major hope in its struggle to feed a burgeoning population, and donated the land for the research center.

There are no ivory towers in ICRISAT's blueprints. "We are a mission-oriented institution," says Dr. J. S. Kanwar, a noted Indian soil scientist and one of ICRISAT's two associate directors. "We're trying to develop down-to-earth technology that the small farmer can use."

Crop improvement is a primary

Old and new combine when modern field implements are hitched to a bullock team.

goal that sends Dr. van der Maesen and fellow geneticists to little known places to bring back wild species of pigeonpeas, chickpeas, sorghum and millet. This "collection of germplasm" — seeds and other genetic material — is the first step in the development of new and better varieties.

Not all germplasm comes from the wild. ICRISAT has 17,000 lines of sorghum in its collection, thanks to contributions from institutions in India, Africa, the United States and other countries where work in sorghum has been carried on.

Sorghum is a cereal resembling corn, but with a spike-borne tuft of brownish seeds instead of ears of kernels. It is a staple human food in the semi-arid tropics, and is fed to livestock in the United States. It can be pounded into flour, cooked as a porridge, baked into unleavened bread and brewed.

In most of the semi-arid countries the yield is about 360-450 pounds an acre. This is considerably below what ICRISAT scientists believe is its potential. Research into improving the yield and quality of sorghum has been carried on in the past in Ethiopia, where the grain is believed

to have originated and where the widest variety of the plant is grown, and in the United States, Uganda, Turkey, and other countries. However, there has been no dramatic breakthrough, such as occurred in the late 1960s with rice and wheat. But ICRISAT has identified several lines that are being field tested for high yield, taste and resistance to disease, pests and drought.

Pearl millet is another staple of the semi-arid tropics. In the United States it is fed to canaries and other birds. The plant produces compact spikes of small grain and has about the same average yield as sorghum, but is more adaptable to extremely dry areas. The seeds are pounded into flour and cooked in the form of chapattis, or served as a gruel, dumplings or couscous. Millet research is attempting to find high-yielding varieties that are resistant to diseases, birds and insects, and still taste good.

"We're aiming to double the average yield of both sorghum and millet," Swindale says. "Increasing them to 1,000 or 1,200 kilograms per hectare would still not be a huge yield, not near their potential, but doubling anything is a pretty good gain."

To develop varieties with the desirable qualities, plant breeders work with the thousands of sorghum and millet strains in test plots and fields. Any hybrids and promising varieties developed from this work are sent to research agencies of the national governments for testing, and eventually are tested by the farmers themselves.

Sorghum and pearl millet, like wheat and rice, are relatively low in protein and a diet of these cereals alone is inadequate. In some areas of the semi-arid tropics, milk, fish or meat may supply the additional protein but they are not always available. The cheapest source of complimentary protein is pulses — legumes such as peas, beans, or peanuts.

Unfortunately, the cultivation of pulses — principally chickpeas and pigeonpeas (which are not unlike the peas we buy in our markets) — has declined. ICRISAT breeders are working with 11,500 strains of chickpeas and 5,500 lines of pigeonpeas. Wild species are cross-bred with domestic types to increase yields, improve taste, and strengthen resistance to diseases and insects.

In India, where 75% of the world's chickpeas are grown, the typical plant produces only small brown seeds, but often two or even three to a pod. Varieties in the Middle East, northern Africa and Latin America have larger, lighter-colored seeds, but produce only one to a pod. The aim is to breed a variety that would produce two or three large, light-colored seeds to a pod.

"We could increase the yield up to five times the present average," van der Maesen says, "And do it with relatively simple management on the part of the farmer."

But this is no easy task. Insects and disease are major impediments to increased production. Dr. William Reed, British entomologist working with pulses, points to the frustrating problems of parasites and insects.

"We don't fool ourselves," he says "Nature is always going to win in the long run. Our job is to try to find practical, short-term solutions that can help the farmer who cannot afford insecticides or disease-fighting chemicals. We're trying to keep one step ahead of the game."

Entomologists have identified 120 pests that affect pigeonpeas. Finding ways to control them is difficult.

"One important thing we have found," he related, "is that planting of these crops among a group of farmers in one area must be done at the same time. Otherwise the pests can go from field to field, causing progressive wholesale destruction."

Much of the work involves studying the ecological and sexual patterns of some of the worst pests. "We have some promising possibilities here," he said. "But we can't talk in terms of what we're going to have in 20 years. We must have answers in five."

Although the genetic improvement of crops is vital to advance the agriculture of the semi-arid tropics, farming systems and practices also need improvement to achieve stable production in an unstable environment. American or European methods will not necessarily succeed in the semi-arid tropics, where rainfall is the only source of water and irrigation is rudimentary or non-existent. The conservation of water is all-important.

"You've got to know what happens to every drop of rain that falls on the land," declares Dr. Bert Krantz, a veteran American agronomist and director of the farming systems program at ICRISAT. Krantz and his staff found that the traditional reservoir used in semi-arid countries is too broad and shallow. Enormous amounts of water are lost through evaporation. Smaller but deeper tanks are more effective in conserving water.

Krantz and his staff have also tested different ways to cultivate the soil, using the animal and human labor. Intercropping — the growing of groundnuts or pigeonpeas between the rows of sorghum, millet, or maize has enormous possibilities. In India, the monsoon has been a limiting factor in plowing and planting.

"About 18 million hectares of black soil lie fallow in India during the monsoon rains because it is too difficult to plow at this time," he says. "With good management a large part of this vast area could be cultivated, providing more income for the farmer and saving his soil from erosion."

Krantz thinks that better and more efficient farming practices can reverse the exodus of rural youths. A tool carrier drawn by a pair of bullocks was recently developed.

The device consists of a frame on two wheels with a tool bar to which implements such as a plow, harrow, planter, cultivator, cant or sprayer can be attached.

"It can do everything a tractor can — only slower," he says.

"This could become an inducement to a young fellow. If he has something to tinker with, he might stay on the farm. The young fellows don't want to farm the old ways. And they want a little excitement. The bullocks and a cart could be used to go into town on weekends and holidays."

The attitudes of youths and others who live in the rural communities of the semi-arid tropics are important elements of ICRISAT's research. Better seeds and new techniques are of small worth if the farmers won't use them. The social and economic impact of changes in traditional ways of doing things cannot be overlooked.

ICRISAT is studying this impact through an intensive survey of 240 households, representing 1,200 people, in six Indian villages. The investigators — Indian students with master's degrees in economics — have lived full-time in the villages for 2½ years. They observe major agricultural operations, what the people like and don't like to eat, attitudes toward traditional methods and innovations, and other aspects of the rural lifestyle. ICRISAT is planning to expand the studies and to sponsor similar village programs in Africa.

The program is carried on in cooperation with the Indian Council of Agricultural Research under the leadership of an Australian, Dr. James Ryan. The investigators have provided a wealth of information on cultivation and cropping, use of labor, employment opportunities and frustrations, sources of family income and expenses, attitudes toward taking risks, diets, health and

Although located in India, ICRISAT provides training for people in many developing countries. Dr. D. L. Oswalt, training officer, explains sorghum production to West African representatives.

The ability to test production under conditions prevalent in the semi-arid developing countries is a major benefit of the Institute's India location.

nutrition. This information is coordinated with the work of the crop improvement and farming systems programs.

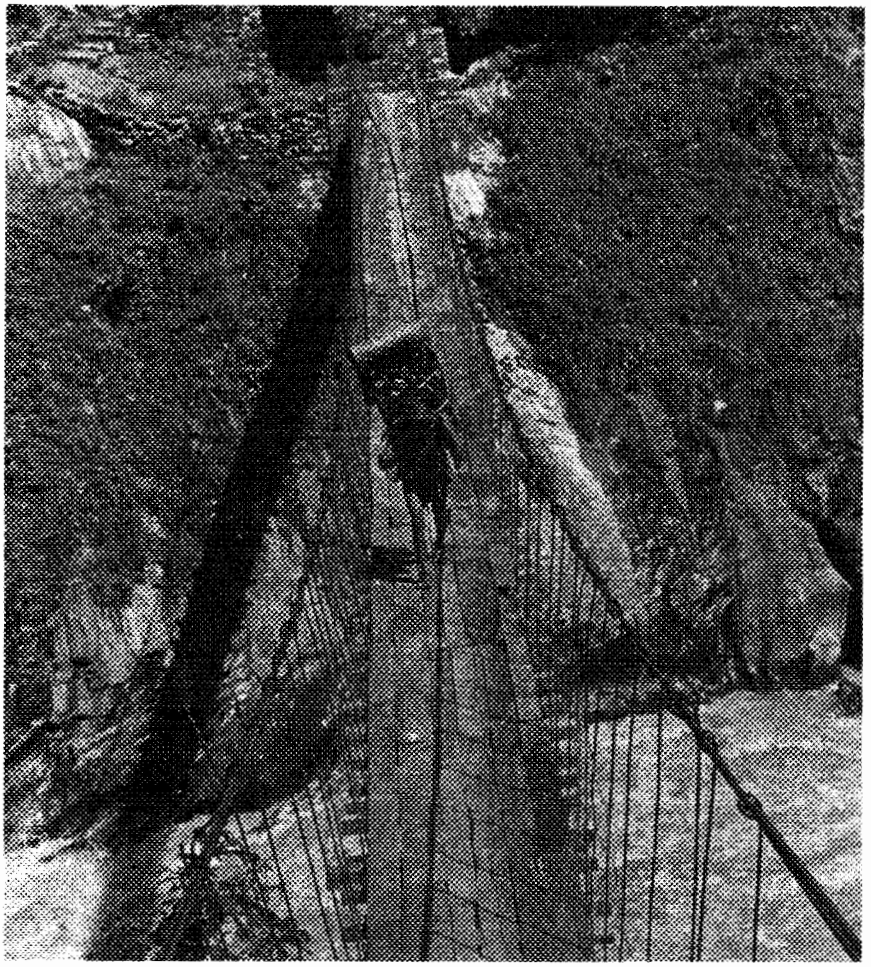
"We have some interesting findings," Ryan reports. "The poorest and most marginal farmers are the most interested in intercropping and farmers in the areas of least rainfall seem to use it more than those in areas where rainfall is more assured.

"In their attitude toward taking risks, there seems to be no difference in this between small and large farmers. We can conclude from this that there may be little payoff for the development of crop varieties aimed specifically at either the large farmer or the small one."

ICRISAT has already had an impact on the developing world. Researchers and technicians from developing countries in semi-arid parts of the world are being trained at ICRISAT. The participants, in turn, return to their countries and teach others what they have learned.

Director Swindale believes this is an important part of the program. "We don't believe it is our responsibility to do the work that must be done by people in the developing countries. We can show them what is possible — the rest is up to them."

NEW BRIDGES MOVE MOUNTAIN PEOPLE



AID's mission in Nepal

A traveler's impression of Nepal is dominated by the extraordinary beauty of the Himalayas, famous for Mt. Everest. Thousands of trails — nearly 7,000 miles worth — meander through the hills. The winding system is the Nepalis' lifeline. Throughout the dry season the trails are crowded with porters carrying essentials such as salt, kerosene and grain to the people living in the hills.

During the drenching monsoon rains, rivers and streams, already swollen with melted snow, overflow their banks and become roaring torrents. Travel is unpleasant and dangerous. Some areas are cut off and must depend on stored food supplies.

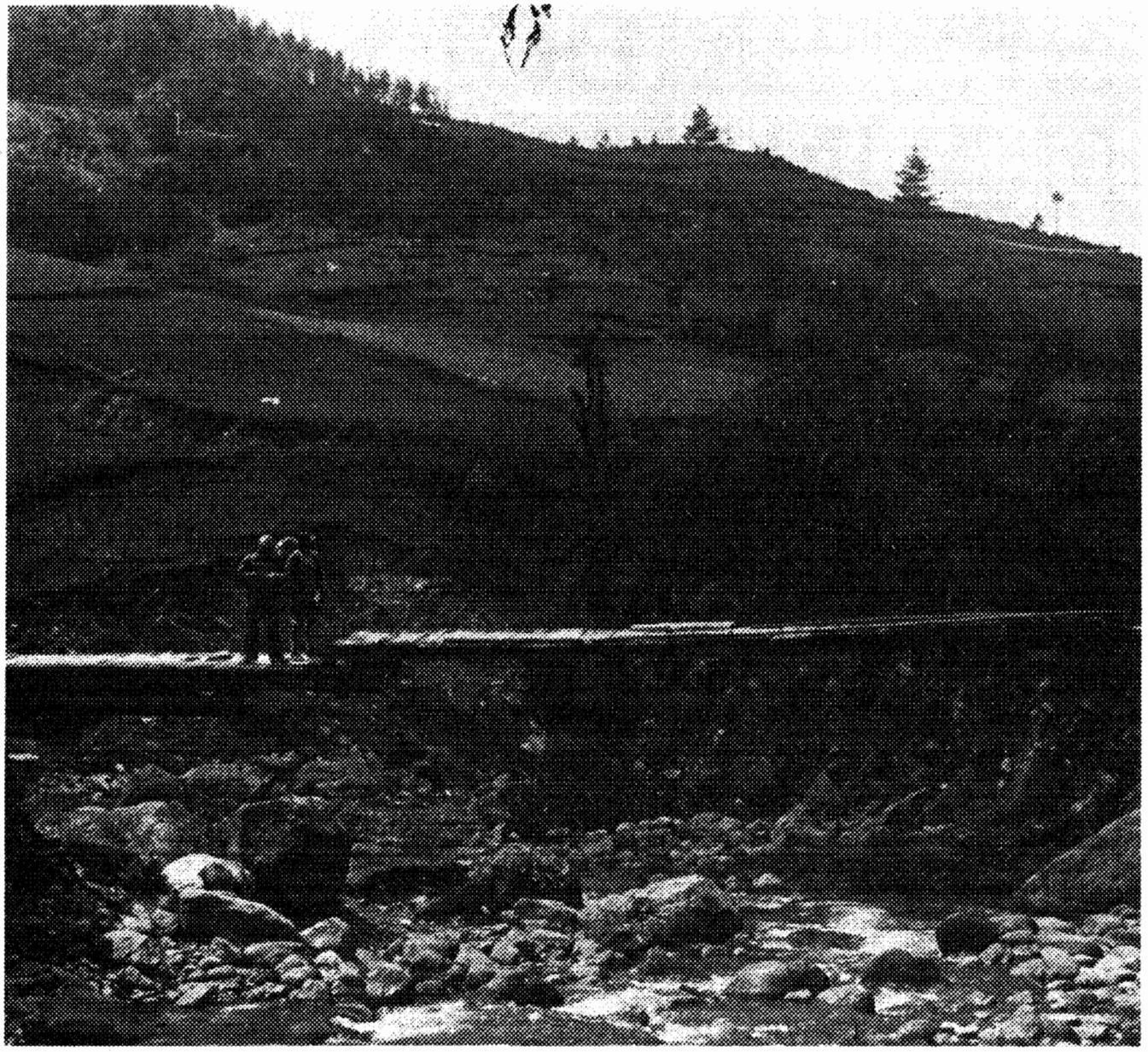
The main mode of transport is by foot. If you ask a Nepali the distance from one village to another, he will tell you the number of hours or days it takes to walk it. Most hill people subsist on an agricultural economy. All goods not produced in the rural area are "imported" by porter or pack animal over the vast trail network. Hundreds of rivers and streams intersect the trails. Sometimes there are bridges, sometimes ferries. Often the river must be forded.

Out of necessity, the Nepalis became bridge builders, with quality varying from bridge to bridge. Simple log bridges and wooden cantilever bridges are common. Suspended bridges of bamboo and twisted ropes span wide gorges.

While the quality of many of the locally-made bridges is questionable, one area in Nepal — the Baglund district — is noted for its skill in bridge construction. Stone masonry is a traditional craft there and Baglund blacksmiths in the area have been manufacturing iron chains for bridges for years.

The Nepal government encourages local technicians by providing material support. Peace Corps volunteers assigned to the Nepal Local Development Department help select bridge sites and mobilize local support.

The United States has been involved in Nepal's bridge building effort since 1958, providing financial support while the Nepal government agreed to be responsible for actual construction and transport of materials. Eight years later, the Nepal government, with AID's help, created the Suspension Bridge Division to oversee all trail bridge projects.



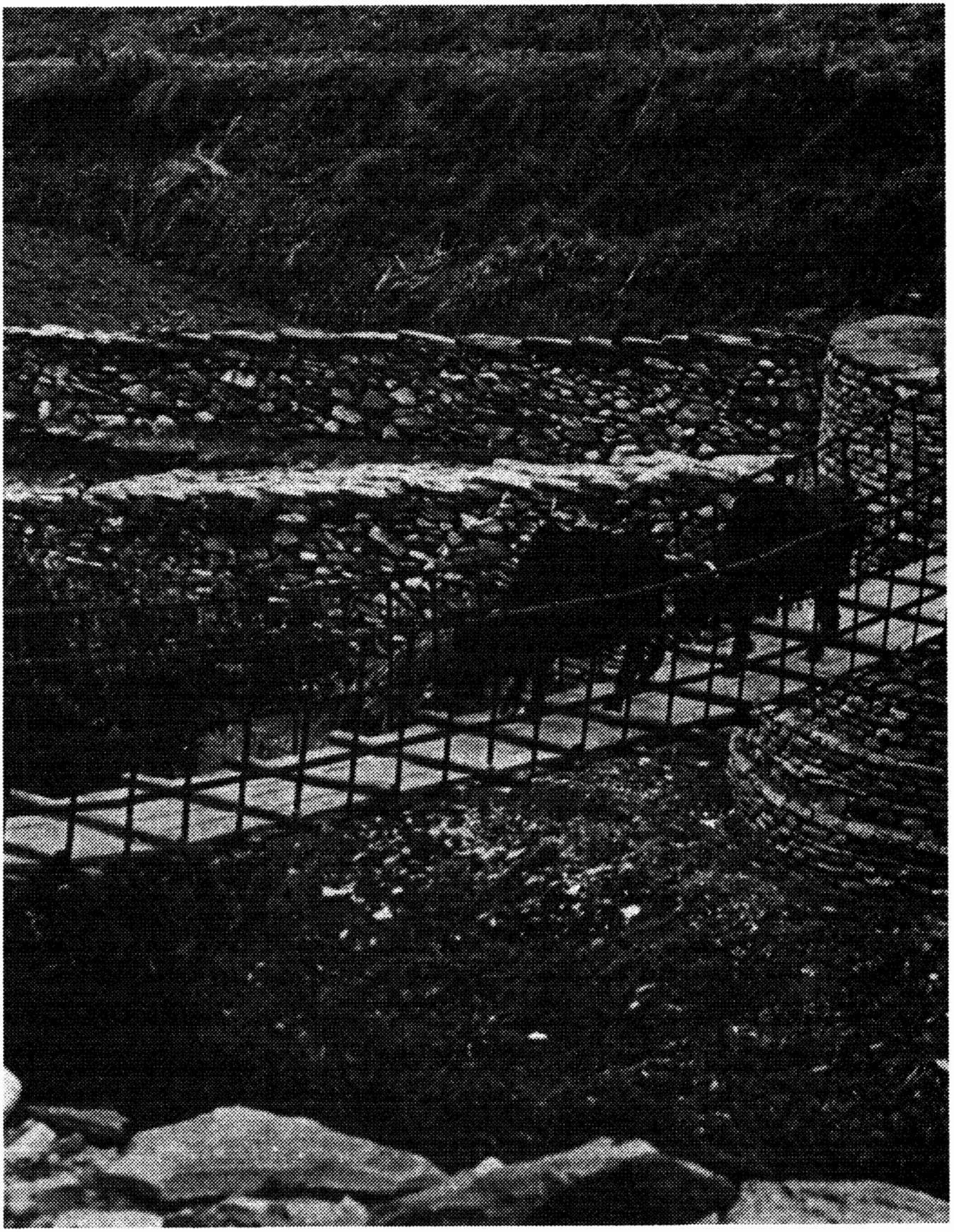
An indigenous cantilever bridge over Ringo Khola on the base camp trail to Mount Everest. Such bridges had been the only link between villages.

Progress was slow at first. Americans had to adjust to working in a culture vastly different from their own. And transportation was a major problem. The cost of any suspension bridge in Nepal is often determined by the distance materials need to be transported. The hills discourage air transport but even when it is possible the rest of the trip may take days or even weeks.

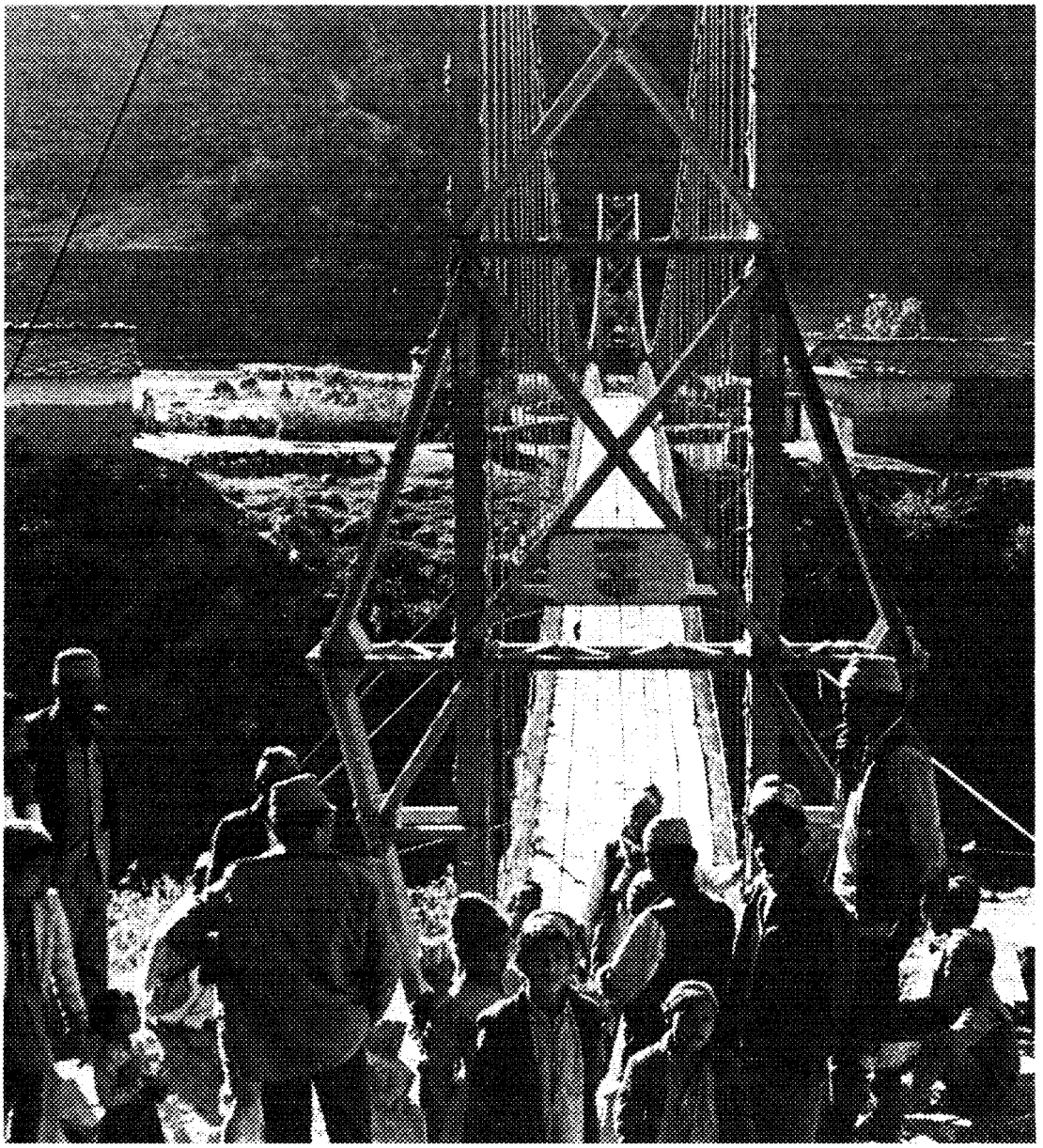
By 1975, 23 AID-financed bridges had been completed at a cost of slightly over $700,000. Last year, AID financed a study of 12 of these bridges to determine what benefits they had brought to the rural areas. A team of Nepali anthropologists, sociologists, economists and engineers examined marriage and religious practices as well as trade patterns.

The results were favorable — the team found the trail bridges have a positive impact on the quality of life in the hills. Bridge use varies according to site, with bridges at traditional crossings and on main trails being used more than those on secondary trails. While economic benefits along main trails are important, so are the social gains along secondary ones, the most apparent the saving of human and animal life. At Toxelghat Bridge, where the Sunkosi River is unfordable year 'round, the study reports that 25-30 men and animals were lost each monsoon before the bridge was completed.

The bridges also have had a significant impact on women's activities. Bridges save them precious time fording or using ferries to gather fodder and firewood. Marriages across rivers have increased and there are more frequent and easier pilgrimages to



A suspended bridge in the Baglund district provides passage for man and beast.



The new steel suspension bridges make river crossings possible in all weather and open up new opportunities for hillside communities.

temples and shrines in a country where religion permeates all aspects of life.

The ease of crossing encourages villagers to use new educational and health facilities. After the Bhingri Bridge was finished a high school was established. 64 students regularly cross the bridge to get to school. A health post is nearby and while many rural Nepalis still believe in the power of Dhamis (medicine men), the bridge has made it easier for people to obtain emergency care.

The bridges have contributed to changes in agriculture by bringing farmers into contact with modern techniques and cooperative stores for buying fertilizer and seed. The new mobility makes it economically feasible to acquire and cultivate land on opposite banks of the rivers. The Pachuwarghat Bridge opened that area to markets in the Kathmandu Valley and local farmers switched to vegetable farming, changing the agricultural pattern.

Finally, the bridges mean that porters can get into the hills in all seasons. Prices of "imported" goods have stabilized and small businesses have grown up in the immediate area of the bridges.

The new AID agreement concentrates on site selection based on engineering, social and economic criteria, with Peace Corps volunteers continuing their work with the Local Development Department. Thanks to the coordinated effort of the Nepal government, AID and the Peace Corps, the Nepalis will be building more and better bridges.

Food Security Through Better Storage

By Kenton L. Harris

Kenton L. Harris is a consultant and principal investigator of the League for International Food Education/American Association of Cereal Chemect on post-harvest grain losses, funded by AID. Harris served as rodent control biologist for AID's mission in India. He has held positions with AID's Office of Nutrition, the Food and Drug Administration, and the Department of Agriculture. He is also Washington correspondent for Food Purity Perspective.

When a farmer banks his money he counts it in and expects it all to be there, plus interest, when he comes to take it out. He would never submit to the banker saying "Sorry, the moths have eaten a quarter of the money." The same farmer will collect his grain in unmeasured piles or bags or bins and later in the year he will be resigned to having only what the moths have left for him.

Political, economic, cultural, biological and other factors prevent us from conquering world hunger solely by producing more food. We have made substantial progress in food production. We may now find it advisable to shift our resources to other parts of the food system. As AID and others have attested, post-harvest loss reduction is a prime candidate for renewed emphasis.

Foodgrains and starchy roots, staple and storable, provide most of the world's caloric intake. We know how to distribute and utilize them. The problem is to apply the known technology to stem the vast waste that now occurs.

We know how to dry, chill, or heat-preserve foods. We know how to keep nutrition in and vermin out. For untold centuries man has dried grain, fish, meat, and fruit. Salt and sugar have been added to bind the water. Milk has been made into cheese. Grain has been stored in various kinds of containers with or without prior heating, cleaning, etc., and with or without protective agents such as ashes.

Grains contribute the bulk of the world's calories and protein. The estimated 1985 production of 450 million tons of cereals will, at 2,000 calories a day, give us 45 billion person-days of food. At least it would if it all got into people's mouths. Unfortunately much of it goes to insects, rodents, and microorganisms.

Grains (cereals, legumes, oilseeds) are also the simplest to preserve. Harvesting and threshing are simple and direct and some drying is usually possible, although in many tropical countries it is difficult to the point of inadequacy. Mud, ceramic, wood, and metal have provided man with containers offering varying protection. Food seeds can be held for months and years, but unless the grain is protected, insects and rodents can wipe out a supply in months.

Post-harvest losses of grains are frequently high in developing areas, where the grain is in short supply. Reduction of grain losses would increase the amount of food available and thus ameliorate malnutrition. Although grain losses could be reduced through the application of known technologies, a critical lack of trained personnel at all levels prevents their widespread adoption. The remedy is training programs, but the need for training puts an added burden on manpower that is already critically short. How long this shortage of trained people can be ignored is a matter of real concern.

Another critical factor is that some human needs outstrip cost-benefit requirements. In all too many parts of the world people are starving or, because of inadequate food reserves or resources, will starve if any of several biological or economic factors tip in the wrong direction. If there were more grain at the right time in the right places suffering and untimely death would be relieved.

There are all kinds of estimates of the grain lost to insects and rodents. But we have few precise figures and these are on specific situations over very limited periods of time. Up to this year there has been no agreed-upon methodology for post-harvest grain loss assessment. This year, a carefully planned contract by the AID Office of Nutrition with the League

for International Food Education and the American Association of Cereal Chemists has brought together the major international organizations dealing with post-harvest grain problems and a loss-assessment manual is now being published.

The urgent need for this manual was highlighted by the general recognition not only that no standard methodology existed, but also that until we had one we could not measure losses and consequently could not measure or compare the costs of loss reduction.

Meanwhile, in spite of the absence of useful global or national figures on losses, approximations have been made by some knowledgeable and respected scientists. Some politically and otherwise motivated figures have been forced into the arena, but a few technical studies and some observation-estimations have shown — and no one has challenged the conclusion — that there are large local and often area-wide losses of harvested grain to insects and rodents.

Living with even a 20% loss of grain (and for many parts of the world this may be a reasonably conservative figure) means living with the equivalent of a total crop failure every fifth year!

Few will argue that there is room for improvement in reducing post-harvest grain losses. Few will argue that known technology can result in vast food savings. The only argument revolves around how and how much? Hence the need for a loss estimation methodology.

The contract provides for the development of methods for assessing post-harvest grain losses in less-developed countries; for the testing of those methods, and for the development of a manual that will standardize the approach to assessment. The mere existence of such a methodology will not reduce those losses. But the methodology can persuade all concerned that change is necessary and that effective techniques for reducing losses stand waiting to be applied. Even financial constraints can disappear when priorities are reordered.

People, industries, and governments have been protecting their grains since before recorded history. Human needs, technical requirements, and success have all been variable in the extreme. Henry Kaufmann of Cargill, Inc., sums it up nicely by saying "Tell me how long you want to keep the grain and I'll tell you how to do it." He then adds: "It may not be worth the effort and cost but we know how."

Cost can be in terms of comparing the cost of bins, drying, and chemicals with the cost of purchasing grain from an outside source.

Cost can be in terms of living or dying. No matter how much effort or exchange it takes, living until an alternative source of food is available may require holding the grain in especially contrived and tended clay containers in a safe place or in special bags that move with the tribe.

Cost can be in terms of an entire people surviving. An example of this is starving people holding back seed grain until a drought breaks. Death by starvation is a cost, the benefit is survival of a people.

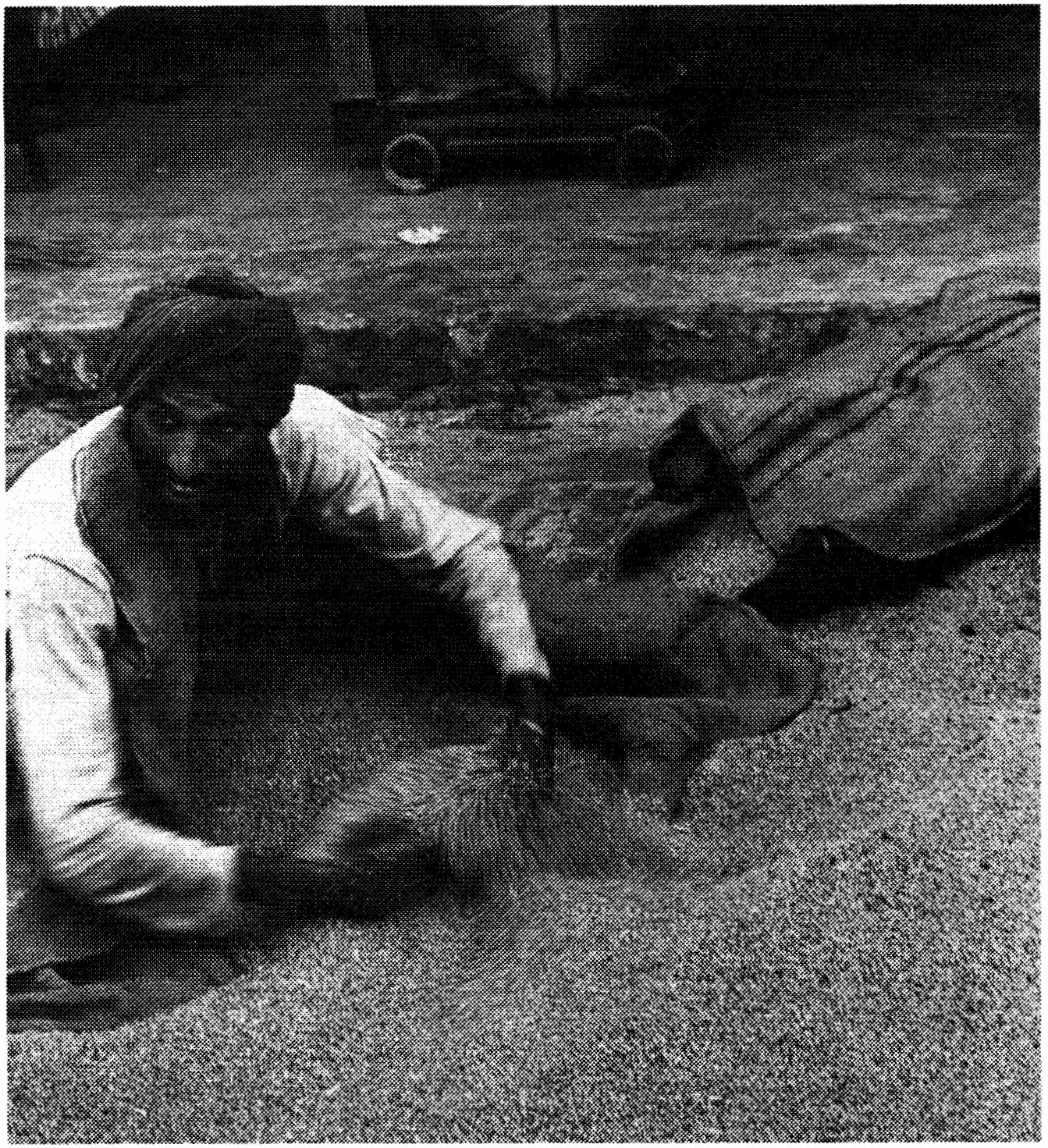
Governments have priorities in costs and benefits. It may be cheaper to buy foreign grain than to raise and protect it at home, but there may be no foreign exchange. Governments may need a strategic reserve or enough to go it alone with hostile neighbors. Governments may need to support farmers, or reduce the price of staple foods. But the usual intervention choices are in economic terms and this is an illusive concept unless we know what the losses are to start with.

The farmer asks, "How much will I save by building a bin?" This is unanswerable without knowing what he loses without it. Farm storage vs. village, central elevators, bins, or warehouses may be decided by political or socio-political priorities without knowing what is lost or saved. But when losses and savings are factors, then losses need to be measured — and by a standardized and useful methodology.

The Post-Harvest Loss Assessment Methods Manual gives us the necessary methodology.[1] Using the manual, one can obtain the broad picture of an area or country grain "pipeline" with its attendant "reservoirs," "flows," "recirculation," etc. One can focus on the larger "leaks," or losses, or on those that have the most serious consequences, or on those that are the most amenable to reduction.

The manual is more than a set of field and laboratory techniques. It emphasizes developing information that can lead to culturally feasible solutions. In some countries central storage is culturally feasible; in others it is not. In some countries cleaning and preparing grain for year-long storage goes against

[1]For further information on the manual write League for International Food Education, 1126 16th Street NW, Washington, DC 20036 U.S.A.



established social patterns; in others it fits in nicely. Measuring the losses can be a first step in determining whether or not an intervention should be attempted; it can then be the first step in convincing locals that the intervention should have cultural acceptance.

Finally, the manual gives us a tool to monitor our technological interventions, record and compare the effectiveness of traditional and new techniques, and develop in-country systems for monitoring and reducing losses.

As food production increases, as our social priorities increase, as we look for more and better ways to make more food available to more people, the storage, distribution, and utilization of cereal grains become increasingly important. We look forward to grain protection becoming as important in the eyes of the developing countries as the Green Revolution.

DEPARTMENT OF STATE
Agency for International Development
Office of Public Affairs
Washington, D. C. 20523

AN EQUAL OPPORTUNITY EMPLOYER

POSTAGE AND FEES PAID
AGENCY FOR
INTERNATIONAL DEVELOPMENT