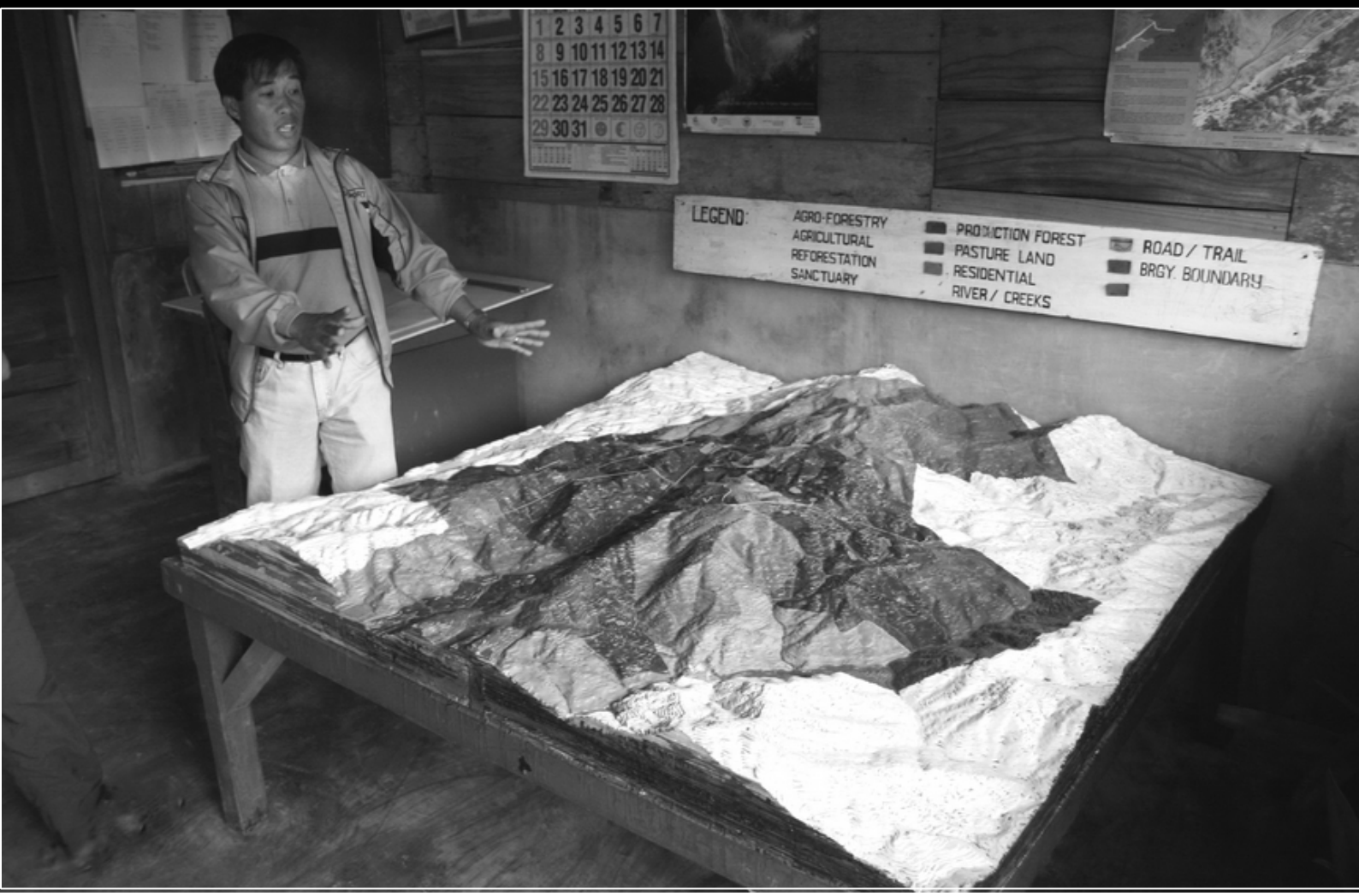
THE KALAHAN FORESTS AND CARBON
A Philippines Case Study

Delbert Rice

Mossy oak forest in the wildlife sanctuary and critical watersheds of the Kalahan Reserve. Photo: Christian Erni.

In 1974 the Ikalahan people of Santa Fe in the northern Philippines finally, after three years of negotiations, signed a Memorandum of Agreement (MOA) with the Philippine Government recognizing the control of the Ikalahan over about 15,000 hectares of their ancestral land in exchange for protecting the water supply for the users downstream. There was no precedent for such an agreement. There was no government program and it was the people themselves who initiated the negotiations.

To enter such an agreement the Ikalahan established the Kalahan Educational Foundation (KEF), incorporating five of their villages. This kind of formal



KEF's own forester, Tamano Bugtong, an Ikalahan from Imugan, explaining the land use zoning with the help of a 3-D model of the Kalahan Reserve. Photo: Christian Erni.

organizing was without precedent, but it worked. The Ikalahan are people of the upland forests in the Cordillera and Caraballo Mountains of North Luzon. They, and their ancestors, have been living in and depending on the forests for centuries.

The first thing they had to do after signing the MOA was to prove to the government that they were serious about protecting and improving the watershed. This requirement was explicit in the MOA. This was no small task because the slopes in the 15,000 hectares covered by the memorandum averaged about 45 degrees. Much of the area was covered by grasses and wildfires were very common. The rainfall is heavy, ranging from 3,000 to 5,000 mm per year. It is not unusual to have three or more major typhoons during any given year and several minor ones. The people knew that the only way to force the water into the aquifers and prevent siltation of the rivers was to create as much forest cover in the area as possible.

The Process

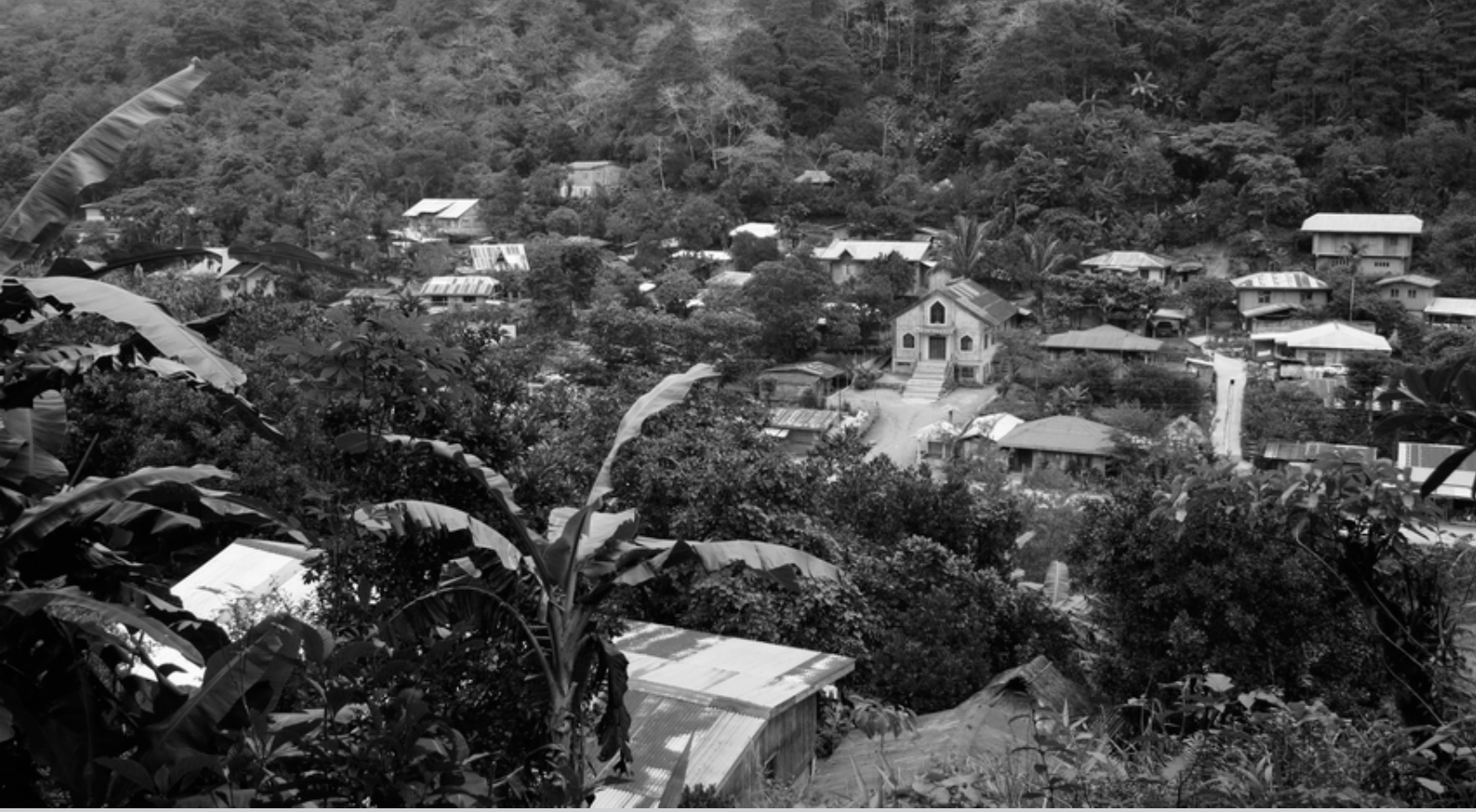
The primary problem in the beginning was the prevention and control of wildfires. Slowly the people brought the fires under control. There were enough trees in most parts of the 15,000 hectares for natural regeneration to take place.

After years of experimentation KEF now produces high-quality jam from forest fruits and people's orchards. They find a ready market in nearby towns and the capital Manila. Ikalahan women run the jam factory of the KEF. Photos: Christian Erni.

The trained young people that were put in charge of the program also established nurseries where seedlings of indigenous species were produced. Every family planted 50 trees during the planting season. Some years the villages chose areas to be planted and everyone cooperated in planting those areas. In other years they just let families plant trees wherever they wanted. Some chose to plant them beside the few roads. Others chose barren areas, especially areas, which had been damaged by the landslides caused by a major earthquake in July of 1990. Some chose to turn a portion of their own private land holdings into good forest by planting the trees within their claims. As far as the tribal elders and officials were concerned, it did not matter where people planted the trees because every tree that survived helped to improve the watershed.

Livelihoods for the families

It was not possible, of course, for the people to put all of their energy into the supply of water for people downstream. Every Ikalahan had to be concerned with providing for his or her family. Although some of the families had small irrigated rice fields which provided a portion of the food necessary for family survival none of them produced enough rice to provide for all of the family needs. Most families depended on swidden farming ("slash and burn"/ shifting cultivation) using the techniques, which their ancestors had developed over the centuries. This method is sustainable and it is possible to produce enough sweet potatoes (*Ipomoea batatas)* and vegetables on their farms to supply all of the basic food needs of



View of Imugan town in the Kalahan Reserve. Formerly denuded hills are now covered with lush forests used and managed by individual families with support from KEF's forester. Photo: Christian Erni.

their families. Both parents share the work of food production.

Their swidden farms, however, could not usually produce enough surplus that can be sold to provide the cash needed by the family for other purchases. From time to time the men would leave the community for a brief time to "*makilagbo*" i.e., earn money from labor opportunities outside of the community.

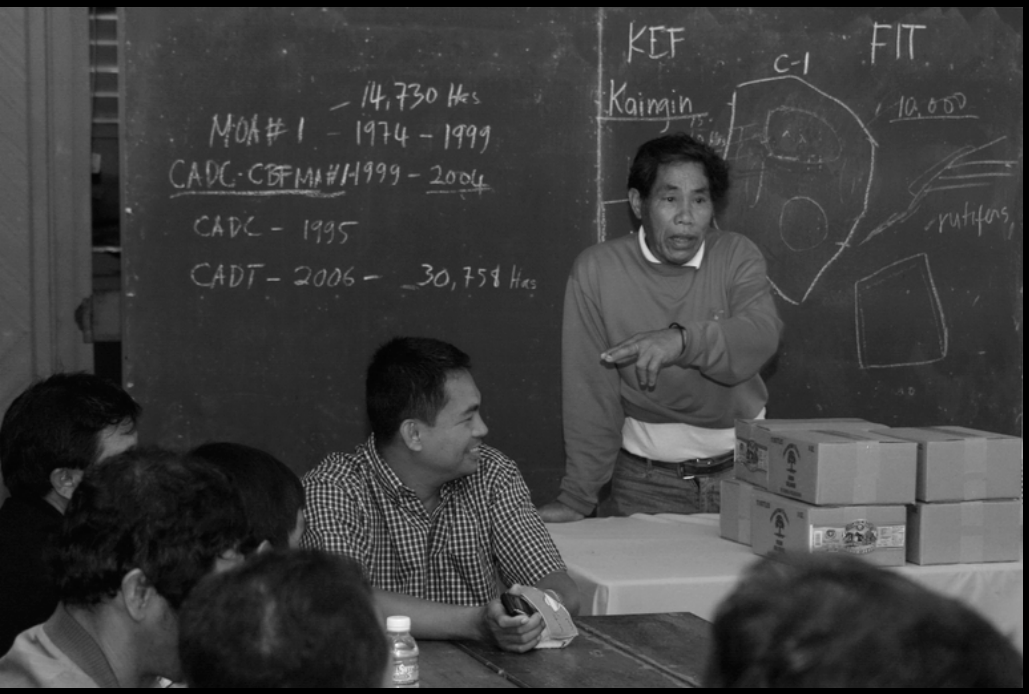
As the various programs of the KEF developed more of the cash that the families needed could be earned closer to home, either in infrastructure preparation or in harvesting wild fruit to be processed in their food processing center which produced high quality jams and jellies, etc. for the urban markets.

How do they manage the forests?

Every family living within the 15,000 hectares covered by the MOA, which became known as the Kalahan Reserve (KR), was given the right to claim whatever land they desired as long as it was not more than 10 hectares and that there was no prior claimant. The leaders set aside about 3,000 hectares as sanctuaries for wildlife and critical watersheds. No one was allowed to stake a claim within these sanctuaries.

Each family was free to develop its own management plan for its own claim as long as it did not conflict with the overall principles of the KEF. Each family was given a written deed and a map showing the claim. Several basic policies were established:

- No agricultural chemicals would be allowed. All agriculture must be organic to prevent pollution of the rivers and damage to the health of the population.
- The claimant must get a permit before slashing and burning a new field each year.
- No trees may be cut without a permit, and the principles of Forest Improvement Technology (see below) will be followed in the issuance of permits.
- No claims may be transferred in any way to any person who is not a member of the Ikalahan community.



Members of the local government of Kasibu municipality attending a training at the KEF training centre. Photo: Christian Erni.

Did they institute training programs?

The only training program that the KEF conducted was training in Basic Ecology. This was promoted initially for all high school students and then for all of the farmers. The village leaders insisted that at least one member of every family attend such a seminar. This enabled all of the people to understand the environment and how the various natural systems functioned. As they came to understand this it was easy for them to adjust their activities to ensure that none of these would damage the systems.

They knew from past experience that merely telling people what to do would not produce results.

What is Forest Improvement Technology?

"Forest Improvement Technology", or FIT, is a system of thinning the forest occasionally to remove trees that are either crowded, diseased or overly-mature. A check list has been prepared which is used by the local forester as a guide so that he/she can show the farmers why a tree should or should not be removed.

No logging or "clear cutting" is allowed within the Kalahan Reserve. By using the FIT to thin the forest, however, it has continued to improve every year and it is now both a good watershed and habitat for wildlife.

The most interesting impact of the FIT is that when it is properly implemented it produces more than three times as much lumber per hectare per year than logging and the process is ecologically sound.

Why Carbon?

In the late eighties and early nineties Moises and Delbert, two of the KEF staff members, regularly read in magazines and newspapers about the problem of climate change. They realized that the same forests that provided water for the downstream irrigators were also sequestering carbon that would help to clean up the atmosphere. They also knew that there was no other effective way of doing it. There are many other carbon sinks on earth but none is as effective or as efficient as the forest.

The tribal elders were continually struggling to find new ways to produce income, which would not interfere with the function of the forest as a watershed. It seemed to be possible that carbon sequestration might be another such opportunity. Delbert and Moises were able to convince the tribal elders of the possible benefits of this. At the same time they made contact with the Biodiversity Conservation Network (BCN)[1] which was willing to fund research on the biodiversity of the area. The KEF staff decided to include the measurement of the amount of carbon in the forests in the research on biodiversity. They had to

Middle: Rattan products made by the Ikalahan are sold in road-side shops along the national highway.
Above: Men butchering pigs for a communal feast. Photos: Christian Erni.

develop a method of measuring the amount of wood in the forest, which would allow them to calculate the carbon content of the different forest types. The method had to be inexpensive because they knew that the BCN funds would be temporary. . They considered the best ways of making the measurements and consulted with as many skilled foresters as possible. Finally, in 1993, a method was worked out.

How to measure it?

The KEF staff had to revise their methods many times as problems were discovered but they persisted and were able to present their base-line data in 1994. Since then they have found it necessary to make improvements to their method several times but the data gathered in that first year was still valuable and the results are becoming more accurate as the years go on. The method may require adjustment in the future but it seems to be both effective and accurate and is relatively inexpensive.

The most critical step is to identify the types of forests in the area. This step was more difficult for the Ikalahan than it would be be for most other communities because the Kalahan Reserve includes a dividing ridge; the vegetation on the western slopes is very different from the vegetation on the eastern slopes. The western slopes are covered with pine with very few other species. The eastern slopes are mostly dipterocarp forests with very high biodiversity. The central ridge itself is covered by a mossy oak forest. The Ikalahan finally classified the three types of forests and three types of coverage: Pine Forest, Thick Forest, Dipterocarp Torest, Medium Forest, Mossy Oak Forest, and Scattered Tree.

This would, theoretically, provide for 9 categories but as there were no mossy oak forests in the "scattered" category there were in reality only 8 categories. There were residual primary forests of all three types but they were all in the sanctuaries and not considered in the carbon sequestration program, which covered only the production forests; these covered 10,000 hectares.

The foresters then borrowed a GPS unit and paced out the boundaries of each different type of forest and mapped them. The mapping could have been done in any of several other ways but this seemed to be the quickest and cheapest but still accurate. It might have been much quicker to construct a 3-D map of the area and let the community leaders mark the forest types. This approach would require verification of the information on the ground before finalizing the map. Satellite images could be used for this purpose but they are very expensive and a specialist is needed to interpret the images. It would still be necessary, even with a satellite image, to verify the boundaries on the ground.

At Kalahan we did not have a 3-D map until much later so that approach was discarded. The foresters just studied the forests on the ground and decided where the boundaries should be drawn for homogenous blocks. Each block had to contain the same mixture of species at about the same density throughout. Some of the blocks were as small as 25 hectares. Others were as big as 250 or 300 hectares. The size did not matter but the type and density of forest in each block had to be homogeneous. The size was carefully computed and recorded for each block.

Once the forest blocks are established the foresters must establish several sample plots within each block. Each plot should contain the type and density of trees which are typical of the block. Each plot should be the same size and accurately measured and marked on the ground. In the Kalahan case each plot is ¼ hectare (50 x 50 meters). As the blocks become bigger then there is a likelihood that more plots might be required. Generally no more than 5 or 6 plots are needed for each block.

As soon as the sample plots are established, the forester or his or her assistant merely goes into each plot and numbers each tree that is 10 cm or more in diameter. The circumference, at breast height, is measured and is carefully recorded in a notebook. The species of tree is also recorded if possible. A simple home computer is all that is necessary to process the data on a spread sheet. Through the application of specific formulas the kilos of biomass or kilos of carbon (the carbon stock) can be computed automatically.

Ikalahan house in the production forest surrounding Imugan village. Photo: Christian Erni.

After three years the process is repeated. The carbon stock computed the first time is then subtracted from that measured in the forest the second time. This gives the amount of carbon sequestered during that 3-year period.[2]

The data for each sample plot should be put into a spreadsheet along with the data for each successive 3rd year after the first measurement. Then a summary spreadsheet is prepared so that the foresters can compute an average of the carbon in the sample plots within each block and then multiply the average by the size of the block. This will give an accurate estimate of the amount of carbon in the block. The total carbon in the entire forest can easily be computed by adding the carbon in all of the blocks.

At the present time, the 10,000 hectares of production forest within the Kalahan Reserve sequesters about 10,000 tons of carbon every year and the rate of sequestration is increasing every year as the forests are improving.

How do they sell the carbon?

That is the next big question and the Ikalahan do not as yet know the answer. We have contacted a "dealer" who has agreed to try to sell the credits on what he calls the "voluntary market". He will receive a percentage of the payment for his work, of course, when he is successful.

It is also possible that the countries and companies that are polluting the atmosphere will approve carbon-trade through the so-called REDD++ programs. There is still no fixed program or policy for REDD++. It is merely a concept that is being discussed, and its future framework is being negotiated under the climate change convention. The technical and social pressures are building up so that something will probably be developed in the near future. When, and if, such a program is approved, the KEF will be ready with firm data.

When they sell the carbon how will they distribute the money?

For the KEF it is very easy. The villages within the Kalahan Reserve are all a part of the KEF. The payment would go directly into the general fund of the KEF

and be used to provide subsidized medical care and secondary education for the local population. Thus the funds would be distributed through social services and not as cash. The KEF could also afford to employ more people to continue to do enrichment planting and otherwise improve the forests.

As the funds become available some portion of the funds can be used to provide initial capital for orchid production, mushroom production or other income generating activities for interested farmers.

Is that the only source of income in the Kalahan Reserve?

Definitely not. It is the intention of the Ikalahan leaders that every family within the KR should find some forest-based source of income.

The production of high value organically grown vegetables is already being done and is encouraged. This can be done in very small plots within the forests and can be very profitable. The predators that live in the forests can eliminate the pests on the vegetables.

Some families are interested in using short logs of *Alnus nepelansis* (Nepalese Alder) for the cultivation of Shiitaki mushrooms. The Alder logs come from trees, which the family has already planted so the program is ecologically sound.

The lumber obtained from the FIT will soon be more than that required for housing within the KR. The excess can be used by small furniture factories.

The sawdust from the furniture factories and house construction can be used as the raw material for producing oyster mushrooms. This can be profitable if properly done.

Pigs can be raised using the waste from food processing as a part of their feeds. This can be profitable if properly managed. The waste from the pigs can in turn be used as fertilizer for the organically grown vegetables. The pig farmers should be careful not to use commercial feeds because antibiotics, steroids and other chemicals are often added to commercial products.

The KEF could produce orchids from seed. There are many excellent varieties and species of orchids in the Kalahan forests, which could provide the seed stock. The seedlings could be propagated by families in a "backyard" forest. This could also be profitable. It is understood that the reproduction rate in the forest is not high enough to enable the people to harvest wild orchids for sale.

The KEF has the technology and facilities to manufacture hand-made paper of very high quality from fibers that grow wild in the forests. If the market for the paper becomes very large it might be necessary to plant more of these fiber species but this can easily be done to make the program ecologically sound and sustainable.

Handicrafts such as baskets can be made profitably from local resources. Brooms have been a standard product for decades. The people plant the requisite grasses for the brooms on the edges of their swidden farms.

New products can be produced in the food processing center. These could include bamboo shoots, mushroom soup, juices, health drinks, bottled water and many others.

What about the water being sent downstream?

The Ikalahan should be entitled to be paid for the amount of clean water being supplied to the irrigation dam downstream. The KEF, even with the help of the municipal government, has not yet been successful in obtaining payments for that water. New legislation would be required but some of the KEF staff are cooperating with other organizations and hopefully such legislation can eventually be set in place.

What about the future?

Even though the money for environmental services has not yet arrived, the communities are very hopeful that money will enable the community organization to continue to function without serious problems. In the meantime, the people maintain their unity and prepare for the future. ❑

Notes

1 The Biodiversity Conservation Network (BCN), is a program of the Biodiversity Support Program (BSP), a consortium of World Wildlife Fund, The Nature Conservancy, and World Resources Institute, funded by the United States Agency for International Development (USAID).

2 The formulas are a bit complicated to write, and are therefore not included in this present report. If a community is interested in learning these, and has begun the work and finished the blocking, the writer or Dr. Rodel Lasco can provide the needed formulas, either on a CD disk or by e-mail.

Rev. Pastor Delbert Rice *is an American Missionary, Engineer and Anthropologist. He came to the Philippines in the 1950s, began working with the Ikalahan in 1965, and continues to do so.*