Doing Things Together: Report on an Experience in Communicating Appropriate Technology

by: Andreas Fuglesang

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THE DAG HAMMARSKJÖLD FOUNDATION

ANDREAS FUGLESANG

DOING THINGS...


TOGETHER

The present volume is a report from the 1976 Dag Hammarskjöld Workshop on Appropriate Technology in Village Development which was organized at Vudal Agricultural College, Rabaul, Papua New Guinea, in October 1976 by the Office of Village Development, Port Moresby, Papua New Guinea, in collaboration with the Dag Hammarskjöld Foundation.

The author, who was asked by the organizers to attend the workshop as an observer and write a personal report on the event, is particularly concerned with the communicative aspects of the process of distributing appropriate technology and also endeavours to define the function of appropriate technology in the context of Another Development.

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The Dag Hammarskjöld Foundation was established in 1962 in memory of the late Secretary General of the United Nations. Its purpose is to organize seminars and conferences on social, economic and legal issues of development.

Other reports dealing with applied communication in the Third World, which can be ordered from the Dag Hammarskjöld Foundation, are as follow:

THE STORY OF A SEMINAR IN APPLIED COMMUNICATION, ed. Andreas Fuglesang, Uppsala, 1973, 142 pp. Price: air mail 35 Skr; surface mail 25 Skr.

APPLIED COMMUNICATION IN DEVELOPING COUNTRIES: IDEAS AND OBSERVATIONS, by Andreas Fuglesang, Uppsala, 1973, 124 pp. Price: air mail 40 Skr; surface mail 30 Skr.

FILM-MAKING IN DEVELOPING COUNTRIES 1: THE UPPSALA WORKSHOP, ed. Andreas Fuglesang, Uppsala, 1974, 123 pp. Price: air mail 40 Skr; surface mail 30 Skr.

FILM-MAKING IN DEVELOPING COUNTRIES 2: HIGHLIGHTS FROM A FILM WORKSHOP, executive producer Bo-Erik Gyberg, 16 mm b/w film (16 min.), Uppsala, 1974. Price: 500 Skr.

THE DAG HAMMARSKJÖLD FOUNDATION, Övre Slottsgatan 2, S-752 20 Uppsala, Sweden

DOING THINGS ... TOGETHER

REPORT ON AN EXPERIENCE IN COMMUNICATING APPROPRIATE TECHNOLOGY

Observations on the 1976 Dag Hammarskjöld Workshop on Appropriate Technology in Village Development, 20 September to 10 October 1976, Vudal Agricultural College, Rabaul, Papua New Guinea

BY ANDREAS FUGLESANG

The Office of Village Development, Papua New Guinea, and
The Dag Hammarskjöld Foundation
Uppsala 1977

The Dag Hammarskjöld Foundation was established in 1962 in memory of the late Secretary-General of the United Nations.
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PREFACE

The case for Another Development has been forcefully argued in the 1975 Dag Hammarskjöld Report and in other publications. Further attempts are now being made to concretize the conceptual framework needed for its implementation. But there are still many obstacles to be overcome before a large-scale model can be tested on reality.

Since Another Development is largely opposed to the prevailing materialistic attitude and rejects exponential economic growth and an accelerating consumption of the world's non-renewable resources, one of the main obstacles to its implementation in the Third World seems to be of a mysterious cultural nature. Mysterious, because there is, in fact, harmony between the ideas and the concepts of Another Development and the societal values, the traditional technologies, the economic practices and the resources available to the countries of the Third World.

In the course of my contacts with the Third World and the work of different international organizations, I have come to think that an explanation of the state of affairs referred to above is that there exists a kind of hidden 'monoculture', a view of development, which operates on many levels. It is manifested through the multifarious and omnipresent cadres of experts and advisers from international development agencies and institutions and from the transnational corporations. They may have the best of intentions, but no matter what their individual *expertise* is, in dairy farming, urban planning, transportation economics, curriculum development or other fields, their thinking has—with some few exceptions—been normatively shaped by the western economic growth model. It permeates the project and programme descriptions, the memoranda and the policy proposals and therefore also the alternatives that come up for decision by those who are responsible, politically and administratively, for development policies in the Third World. The set of concepts which are characteristic of the model also serves as a shared psychological reassurance in this community of experts, through a language which has the role of seemingly uniting often disparate professional views. It should, perhaps, be added that the national educated elite also forms a part of this international development reference system.

Another Development is based on a new system of values. It can succeed only to the extent that the system can be applied to the concrete national realities of the individual countries. An obstacle to overcome is that the concept of Another Development is not yet operational. It is not enough to know where one wants to go, one must also know how to get there. The practical problem is to create operational

models which combine the elements in a viable way and which can ultimately be tested empirically.

In this report on the workshop, Andreas Fuglesang draws similar conclusions from his vivid and sensitive observations of the ideas and reactions of the workshop participants at Vudal and of the people he encountered in the surrounding villages of this part of Papua New Guinea. But in seeking to relate this experience to a larger whole, he justifiably draws on the broad knowledge he has acquired during a long career as communications adviser in a number of Third World countries. Having a practical outlook he sees the organizational, managerial—and ultimately political—problems of social development as being essentially communication problems, which can be solved as such. In this context, it is worth drawing the attention of the reader to a change of perspective in Fuglesang's thinking. The traditional colonial extension method for transfer of knowledge in development work now appears to him as a professional failure. In this report he therefore moves away from the reformist approach, which has so far characterized development support communication activities, and points to a fundamental change in the communicative structure of society as a prerequisite for development.

Putting the emphasis on communication is one way of approaching development issues. The ultimate criterion of its validity is, of course, whether it contributes to our understanding of a social reality and, in the final analysis, whether it becomes a useful tool in practical development work.

The basis for the present report is the 1976 Dag Hammarskjöld Workshop on Appropriate Technology in Village Development, held at Vudal Agricultural College in the Province of East New Britain. It is a pleasure for me to end this preface by thanking the Office of Village Development of Papua New Guinea through its Director Jean Kekedo, its Appropriate Technology Consultant, Tony Power, and its Administrative Officer, Noel Lewis, for the intellectual and organizational efforts made by them and their many collaborators both in governmental and non-governmental institutions in the planning and implementation of the workshop. In concluding, it is equally pleasant to thank Andreas Fuglesang for having interpreted the results of their work to us in such a thought-provoking way and for his attempt to break the previous 'monoculture' of developmental thinking by constructing a communications model for Another Development.

Uppsala, March 1977

Sven Hamrell
Executive Director
The Dag Hammarskjöld Foundation

INTRODUCTION

Appropriate technology is often characterized as a technology for the poverty-stricken, a technology that can help the world's poor to help themselves. I consider it unfortunate that the concept of appropriateness is becoming linked, in this way, onesidely to a poverty situation, however predominant that situation is. The concept basically expresses a measurement of value and it can in fact be used to characterize technologies in an infinite number of social situations. By tying it to a poverty situation we make a doubtful value judgement, ruling out the richness of human resources which is what is really in question. There should be no sense of inferiority attached to appropriate technology. In whichever form it materializes it is a tribute to man's ingenuity.

The 1976 Dag Hammarskjöld Workshop on Appropriate Technology in Village Development at Vudal Agricultural College, Rabaul, Papua New Guinea, was a large-scale operation, planned and organized by Jean Kekedo and Anthony Power and executed by a large number of instructors and participants. The programme was tough and comprehensive. There were numerous practical exercises and few written papers, and so many work groups did so many different things in so many different places that this report cannot be more than impressionistic.

I attempted to apply the method of participant observation, listening in on discussions, giving a hand in groupwork and carrying on individual conversations—only to discover the limitations in my ability to perceive and understand the richness of people's thought and behaviour. The culture I suddenly met at the Vudal workshop was a revelation to me personally, but I am anguished by the responsibility of having to report on it.

Workshops of this nature are sometimes peculiar experiences. They are in a sense models of reality in which events are simulated. What turns out to be significant as the workshop evolves will often turn out to be significant also when the events are transposed on a larger national scale.

As the importance of self-reliant development has been increasingly recognized, more and more attention has been given to the role of appropriate technology. Experience so far seems to show that credibility and political support is best developed by successful achievements in selected areas or villages rather than by untested programmes carried out in a big way on a national scale. There is otherwise a danger of ending up in technical gimmickry, particularly if sufficient attention is not given to the social mechanisms and local institutions

without whose positive cooperation the objectives of the appropriate technology movement are not likely to be fulfilled.

Other valuable experiences have already been obtained in this field in both Third World and industrialized countries; they supplement those made at Vudal. For this reason, I have thought it important to aim also at a larger audience in this report and to include in it some of the recent thinking in the field of development organization, management and communication. At the same time it should be pointed out that the report is not written for the scholar but for those who grapple with the problem of introducing the idea of appropriate technology and of organizing the framework for implementation.

What is between these covers is just an outline. Those who want to fill it in with theoretical detail should go to the sources from which I have borrowed heavily. I shall mention particularly the late Jarko Cerha's thesis. *Selective Mass Communication* (7), probably the most advanced contemporary research work in its field. *Towards a Theory of Rural Development* (2), written by Wahidul Haque, Niranjan Mehta, Anisur Rahman and Ponna Wignaraja, should also be flagged for worldwide consultation. Patrick van Rensburg's *Report from Swaneng Hill* introduces the kind of experience which stands like a rock in the rapids of educational philosophy. I would like to mention also a work by Jim Tyler and his students, *Papua New Guinea – Agriculture and Resource Technology* (3), an initiative which merits a better destiny than the mimeograph.

Thanks go to the participants and instructors who made the workshop at Vudal such a meaningsful experience. I reserve particular thanks for my room mates Walaga Yaba and Manasa Radrotini, and to David Drayeu and Raphael Oraka for their patient explanations. Applause goes to Jean Kekedo, Tony Power and Noel Lewis, whose talent, thinking and hard labour made the whole venture work. My friend Bo-Erik Gyberg has again firmed up my shaky photography in the dark-room.

January 1977

Andreas Fuglesang

THINGS PEOPLE DO ALREADY

If the Garden of Eden was somewhere, it must have been in the wonderful land of Papua New Guinea. This morning's light is so full of honey. The forest abounds with the fruits of all possible temptations and with the chirping song of, yes, of course, the birds of paradise and their rainbow-coloured colleagues. The sea is shimmering with smiles and laughter—what else can it shimmer with when dozens of village children take their morning bath there? And here I am sitting under a tree and I want you to come and sit beside me. I think we should both sit quietly together and listen. This is not an appeal for an act of romanticism on your part. It is a confession on my part of the need to be silent before the noises of the day overwhelm us.

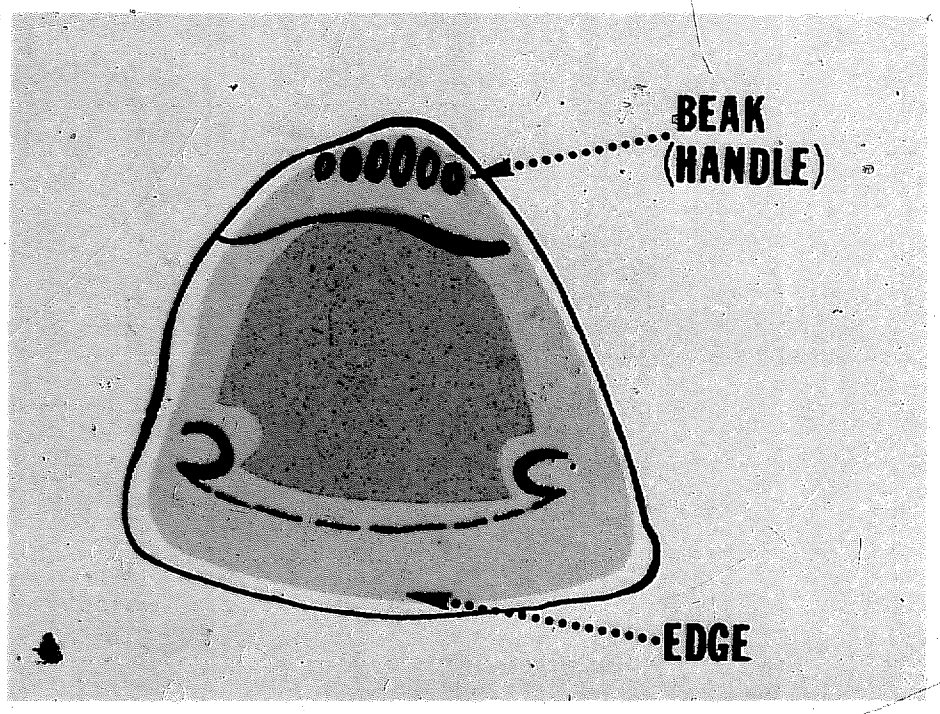
Before we push ourselves over the brink of the present into the technological labyrinth of the future, we should perhaps try for a few moments to recall something of the past. Village people have had their own way of doing things for thousands of years in Papua New Guinea, their own methods, tools and technologies and they have been sharing them with each other. How can we try to share technologies with people without knowing anything about their own long experience? Can a new technology be appropriate to people without being a meaningful extension of their own experience?

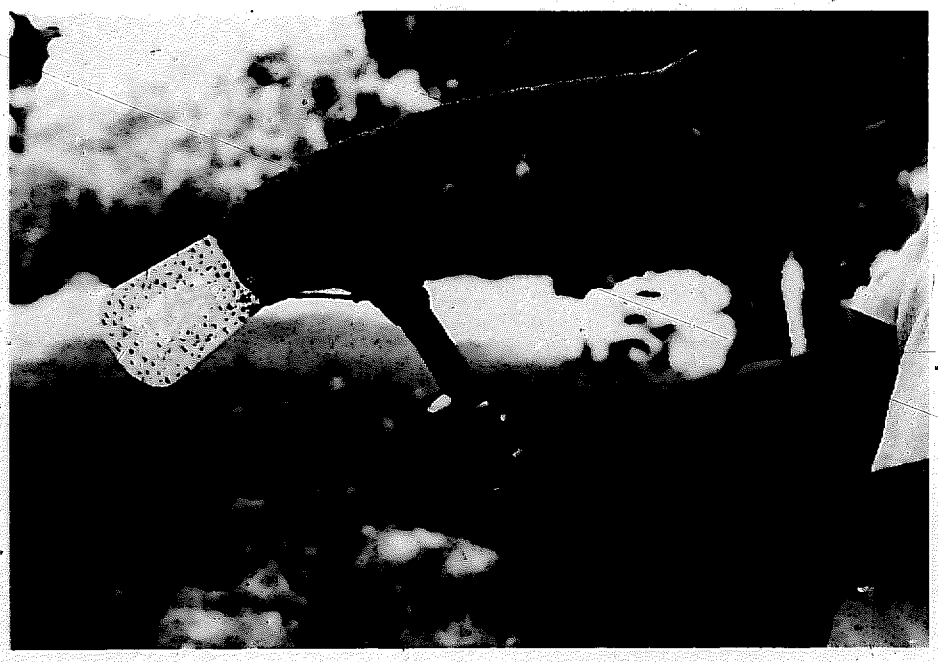
I want us to sit quietly together under this morning's tree and listen to what people have to say about the simplest of things in their environment—shells, stones, bamboo pins, wooden sticks, green leaves. This is, for example, what Margaret Hamanin can tell us about shells:

'In my home area people use shells in many ways. I will explain how the women make a kau kau (sweet potato) peeler. The types of shell we use are called bivalves. Usually the shells come out at night at low tide. You can see them with the two sections half open in shallow water, feeding on seaweeds and small fish. Once you get the sight of one, be ready, because it is very sensitive to light. Then it may draw in its foot and close. When you collect shells you need a reef basket and a torch you can make out of dry coconut leaves.

'Pick up the shells and put them in the basket carefully so that you don't crack the shell or scare it to close quickly and die. If it does it is difficult to open it again. Bring the shells home and put them in a pot of salt water overnight. Then the shells will feel they are still in the sea and they will remain open when they die. You can get the flesh out and the outer layer removed by cooking the shell or leaving it to stink. If you do the latter you have to build a rack in a cool place away from people's houses, so that it does not create bad feelings.

'When the outside layer is lost we do the final processing. Take the shells to the beach and grind them in the sand till you have a smooth





outside. Only grind the edge area from inside. If the middle part of the inside is ground the smoothness is lost and the shell loses its beauty. The processing can take up to three days depending on how many shells there are and the labour the shell maker puts into it. If there is no sand for grinding, stones can be used instead. I find that leaving them to stink is the best method. We get a good long-lasting peeler, heavy and comfortable to use in peeling kau kau, taro and tapioca.'

And when Margaret Hamanin's reef basket is worn out, her torch burnt and her peeler broken, the tools of her technology disappear quickly back into the nature they came from.

The words Stone Age have acquired a particular connotation in our colloquial language. Perhaps we should listen to what Andrew Yamanea has to say about that:

'Somehow the axe had to be made available. Otherwise, without the axe, man could not have been a success in his jobs like building canoes for travelling by sea, houses for shelter, spears, bows and arrows for hunting, etc. Some men found minerals and worked them into steel axes. Others made their own out of stone.

'Men from my region in the Highland provinces with their stone axes did as much work as with a present-day steel axe. Well, when I say this you might think that the stone axe should have done the work not as well as the steel axe, but I can assure you there is not a single difference in the work done. My wantoks brought some of the old things that were made like that to a tourist who did not believe it. We had to bring an old man who told the tourist that truly this was made by using stone axes. Remember, you could be just like that tourist, despite your excellent guessing, so you might as well believe my words.

'The actual obtaining and making of the stone axe is rather complicated. Most likely, anything of vital importance in your life is not obtained easily, and often you cannot find it around your home area. The slate rock best suited for making stone axes was found in Kudjip in Whagi district in the Western Highlands. Through exchange of such things as bird-of-paradise plumes, tree-bark oil and native salt, the man obtained a portion of the slate rock for his axe.

'The stone obtained through exchange was just in an irregular shape. Along the grain of the stone and with a certain force the man

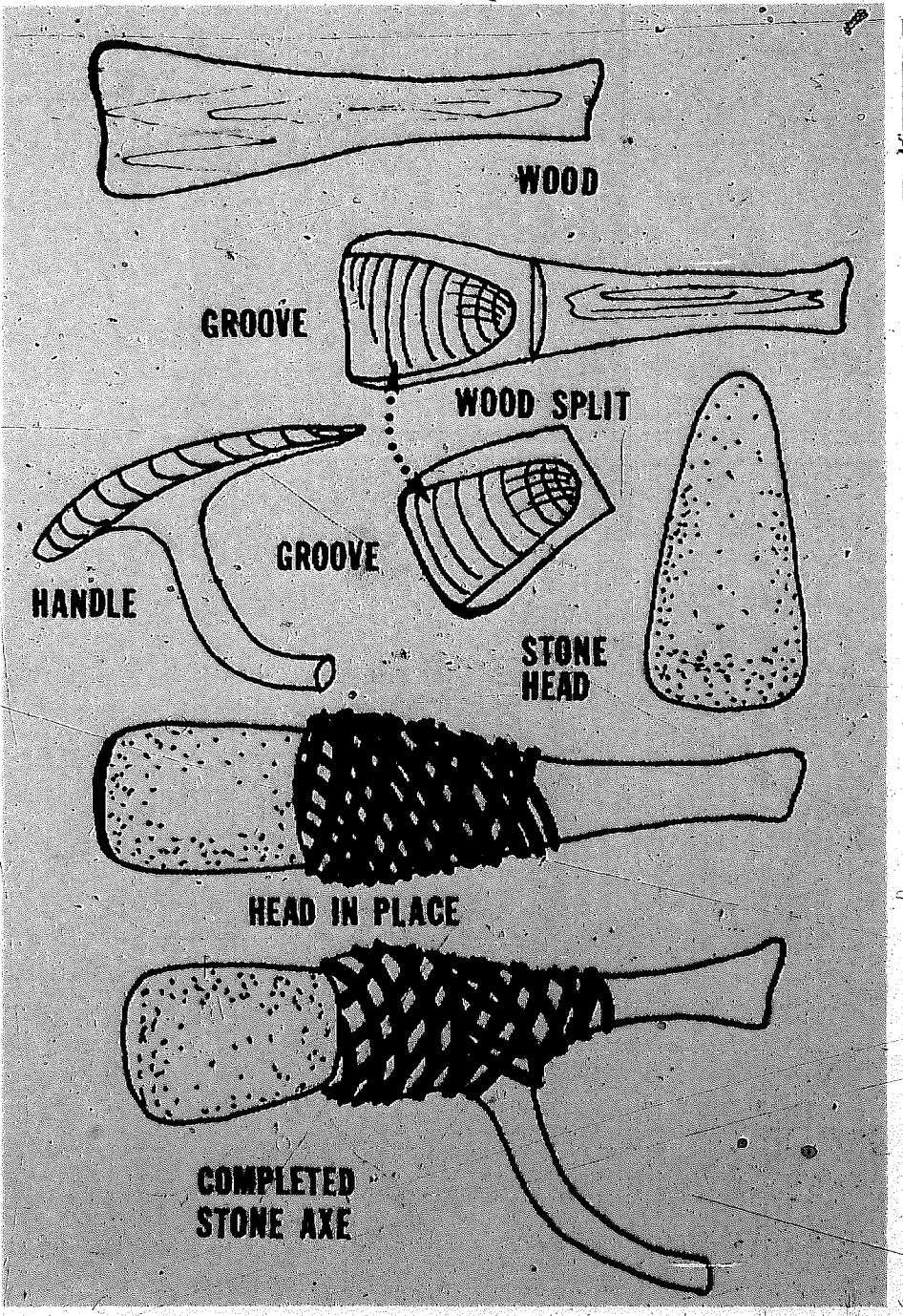
using a small bar-like stone removed the unnecessary parts of the slate and shaped it into a rough stone-axe shape. This use of limited force to remove the unwanted portions of the slate was very important because if not done properly that stone, as expensive as anything, turned into a heap of useless gravel.

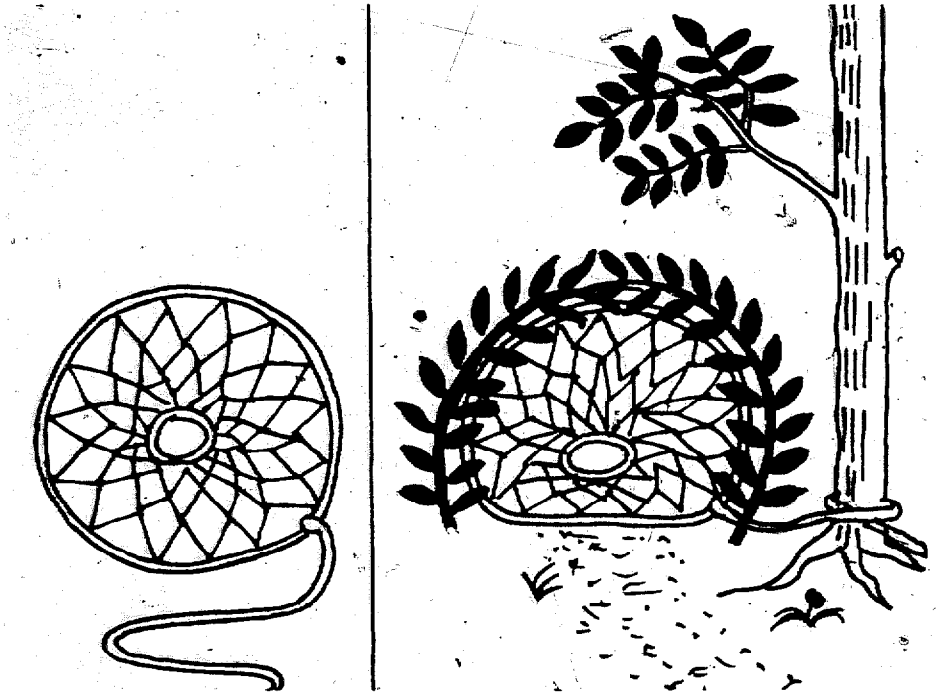
'The roughly made stone axe was taken to the riverside and rubbed against other stones for further smoothing of the surface area and actual shaping of the stone into the required size and shape. While smoothing the surface the man had to decide whether the axe was meant for light work or for heavy work like cutting big trees, fencing, etc. The thickness of the axe had to be made accordingly. The thickness is very important because this determines how long the axe will last and how much it will work. When the correct shape is achieved, the man sharpens the blade.

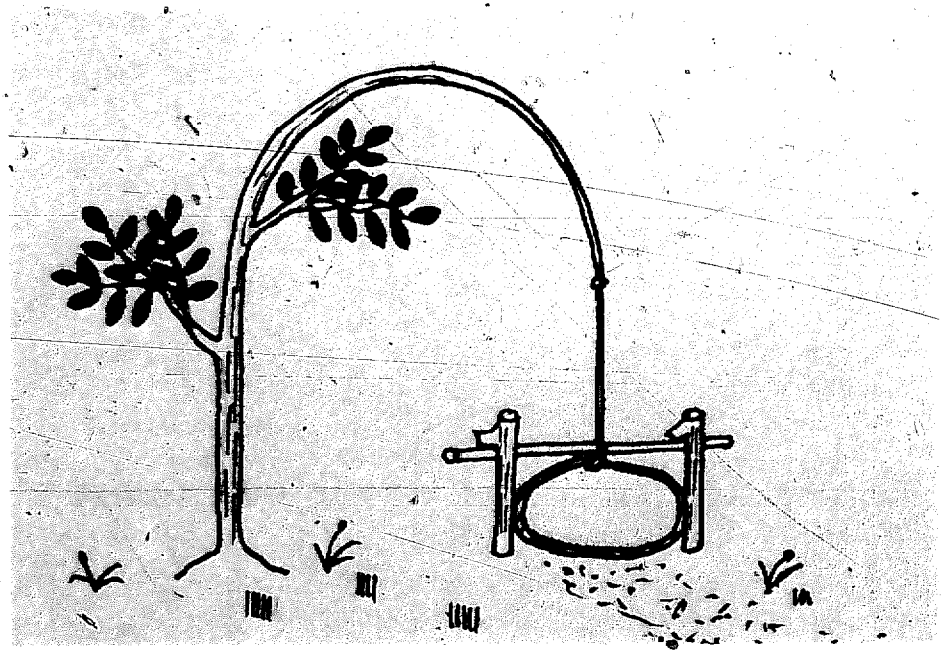
'The man then sets off into the bush to collect materials for the handle: one piece of wood for the handle, one piece in which the head of the axe is to be fitted and rope taken from tree bark to tie the two pieces together. The head-piece is shaped and split in two. Then at the centre of each split the man makes a groove according to the shape of the stone. Then, with the stone placed inside the groove of the piece of wood, the splits are wrapped with ropes. After the man has done this the whole piece is placed on the head of the handle and carefully wrapped with ropes. When the two parts are carefully tightened together, then the completed axe is made and is ready for work.

'Though the stone axe can do the same jobs as a steel axe, the labour input in making the stone axe is too much and the present generation is forgetting about the stone axe which did a lot for their past fathers. Instead of being a working axe, it has at present turned out to be one of the outstanding wealth symbols. The man who can make a stone axe can earn around 300 to 400 kina, which is a good income.'

Listening to this story we may find various aspects of a truth, depending on who we are and where we come from. Some will say that the production of a stone axe requires a highly developed technical craftsmanship. Others may say that people outside a money economy are also very rational economists. They know very well, for example, the value of their labour input compared to other inputs in a working situation. Others again might ask the question: how will these people's attitudes, life style and whole experience with one technology affect their interaction with a new technology?







Noga Uru. Matru Sengo and Beniona Levi know something about hunting and trapping technology, so let us now listen to what they have to say:

'About twenty years ago all young boys were trained as hunters. None must lack these skills. The village chief organized the hunting and the men went into the bush and spent three days hunting. The hunter needs equipment. If he hasn't got these things then he can't hunt: a very sharp bush knife, a file for sharpening it when blunt, a spear and finally if the hunting is going to be very successful he must go with three to five dogs. Training of dogs is important. There are always one or two bosses of a squad of dogs. This boss is very smart. He smells the pig first and starts barking when he sees it. Then the others come and join in surrounding. New dogs are made to taste the blood of the pig so that they will now be familiar with what they are supposed to do in the bush. After this young dogs will be excited and then have a desire to hunt. When the hunter hears all dogs barking that is the time when the pig has no way of escape. So the hunter runs to the barking place. When he approaches the area he should see the pig helpless on the ground, but if the pig is still strong on its feet then this is the time when he spears the pig to the ground. If the dogs make the pig fall then there is no need for spearing.

'When the hunter wants to go hunting, he carries his spear. He hits the spear, which makes a noise. Then the dogs come running. The hunter knows where to go for pigs. When it is time for bush mangoes he goes to the trees because he knows the pigs will be feeding there. When during the dry season, pigs look for food around the big river, the hunter goes there.

'On Karkar island the people use bamboo pins, wooden sticks, leaves and rope made from the fibre of the tulip tree to make pig traps. The fibre is dried in the sun to remove the sap and become tender and strong and then made into ropes. In making the trap first the hole is made. This hole is for the pig to put the nose through and avoids cutting the ropes. Then after that the thin rope is knotted into shapes as a fish net. At the end of the trap is a long rope. It is for tying the trap to a tree and stopping the pig from reversing back. The size of the trap is measured by stretching both arms.

'As the hunting time approaches the men take the trap into the bush. Flexible wooden sticks are driven into it to give it a low shape and

the ends of the sticks are pushed into the ground. The trap is built across the pig's track.

'The people of my village for many years kept on telling their sons and grandsons how to make traps. We do it another way. We simply collect one bigger stick, some small ones and a cane. The big stick is planted in the ground by a pig track. The two smaller ones are hammered in the ground just in front. The big stick is bent towards them with the cane and hooked on. In between the two sticks a loop is placed. This is to catch the pig when it goes into the loop. What happens is that the pig actually unhooks the cane from the two sticks and the bent stick springs upright holding the pig. Then the pig is killed and carried home.'

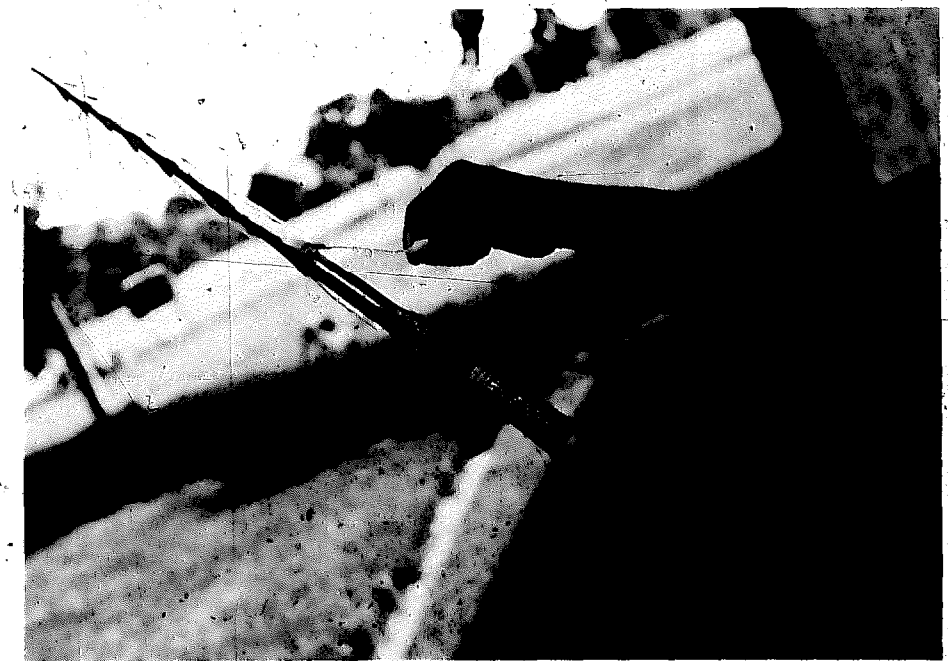
J. R. Varua from the Solomon Islands tells us about the simple technology they use for catching dolphins and porpoises: producing sound under water by hitting or rubbing two stones against each other:

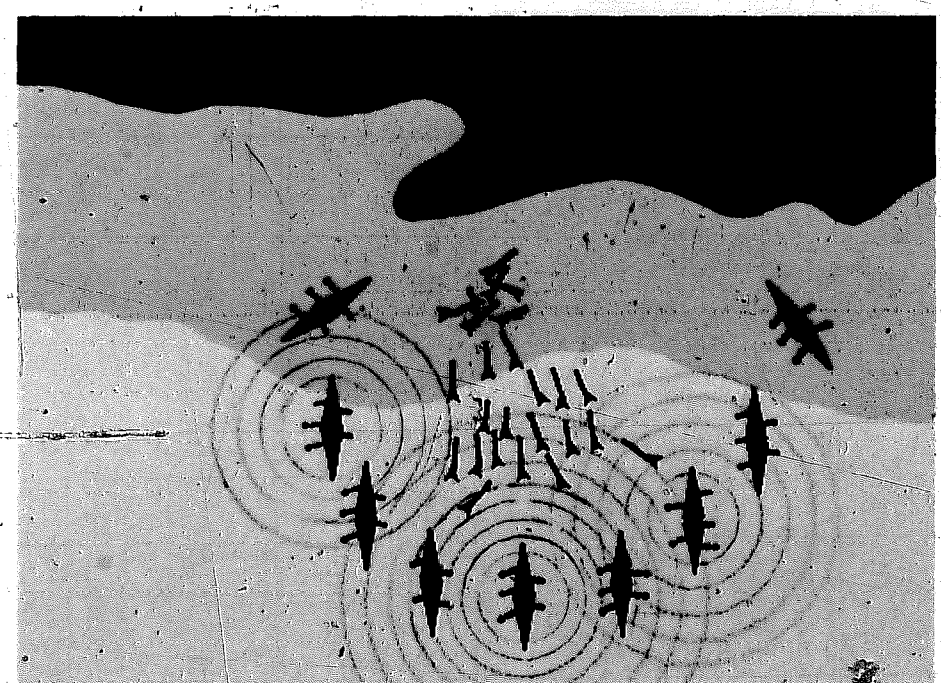
'A total of twenty-five or more fast canoes follow the animals when they emerge from the bottom to draw air. When the dolphins and porpoises hear the sound of the stones they become distracted and restless. They will swim away, followed by the canoes producing sound for distraction. After ten or twenty minutes, depending on the sea, the canoes following the school here and there tire the animals, and when they are not moving very fast, they are moved ashore for the catch.

'In moving, the canoes are paddled in a semi-circle leaving the base empty for the fish to be chased ashore. The closer the canoes come to the shore, the smaller the semi-circle becomes until the shallow of the reef is seen by the animals. As they come to shore they dive down and give their lives away. The sound is stopped and the fishermen jump into the water and lead them to the beach and pull them ashore.

'The reason for our catch is three things: The meat is eaten. The fat and oil is to produce candles which produce lights for the villages. And lastly the teeth are very valuable as a source of money for buying things. With porpoise-teeth money you can pay for anything, such as food, wives and so on.'

If we want to teach people about transport technique we should listen to the woman first. After all, we have been misusing her for thousands of years as a beast of burden. Mamel Bog, for example, can tell us a lot





about the making of different types of baskets for all sorts of transport and storage purposes from preparation of the leaves to plaiting of the pattern. Perhaps this time we should look at the pictures instead of listening to the story. The beauty of this basket is in its graceful functional form. It is shaped both by the nature of the material it is made from and by the nature of its purpose—and, of course, by the woman who first saw the idea with her inner eye. A magnificent piece of appropriate technology.

We are trying to communicate appropriate technology and we want to know how to do it. I shall not draw any conclusions with you from what we have heard under this morning's tree. All I am trying to say is that people's ideas and interests are alive and valuable like dolphins and porpoises.

We have to show the same ingenuity and produce the right sounds if we want to catch them. The trouble is we cannot listen properly when we start the noises of the day, demonstrating the chain-saw or bashing the corrugated iron sheets. Introduction of appropriate technology should be linked to an understanding of the existing traditional technologies. A relevant question is, indeed: how can the traditional technologies be shared (16)?

LEARNING BY DOING

The workshop featured a wide variety of appropriate-technology projects for the participants to work on. The practical work was done in the mornings and the afternoons. The discussions took place in the evenings. Food and nutrition, agriculture, water and sanitation, and building and materials were among the major fields, but there were also displays, demonstrations and activities in other areas such as leatherwork, pottery, blacksmithing, fish-drying and -smoking, charcoal-burning, etc.

The organizers outlined the basic programming of the workshop this way:

The basic programming of the Workshop is as follows:
1. Week I: the whole week will consist of a wide display of all the appropriate-technology equipment and processes that we can assemble and demonstrate.
Students will use this week to immerse themselves in all aspects of appropriate technology.
2. Week II and Week III will be scheduled in the following way:
(a) Morning periods will be devoted to the four basic courses, namely Food and Nutrition, Agriculture, Water and Sanitation and Building and Materials.
Students will choose two courses, following one the first week and the other the second week.
(b) Afternoon periods will be devoted to activities of the student's own choice. This will allow the student to explore one or more areas of skill in an in-depth manner so that he/she can take home that new skill.
(c) Evenings will be spent holding discussions and viewing films and video-tapes about aspects of village development.

The final day, Sunday October 10, is to be a Show Day open to the public. We hope to stage a mumu and singsing at which there will be distinguished Papua New Guinean and overseas guests.

Tony Power, the workshop organizer, characterized the participants this way:

'In all forty-two students were present for all or part of the three weeks. Unfortunately the number of women was very low, only three out of the forty-two students.

'The students were almost all educated people, mostly working in the modern sector and mostly for the government. The largest group were Community Development Officers working either with the government or with non-government organizations. About 20 per cent were Adult Education Officers or teachers. The most important group, as it turned out, were village workers. These men had worked for varying periods in the modern sector but had left it to return to their village to promote village development. Often their influence extended

to surrounding villages, which were in the process of being organized into development associations. Though less than 20 per cent of the group, these men had a very great impact on the whole tone of the workshop.'

A workshop approach has many advantages over other study methods: the participants in the latter seldom get the chance of moving away from and beyond the realm of verbal interaction. In the workshop at Vudal the participants were, indeed, offered excellent opportunities for action in the realm of reality, for interacting with concrete functioning technology and for using and creating objects. During the evening discussions, Jean Kekedo and Tony Power repeatedly outlined the purpose of the workshop for the participants:

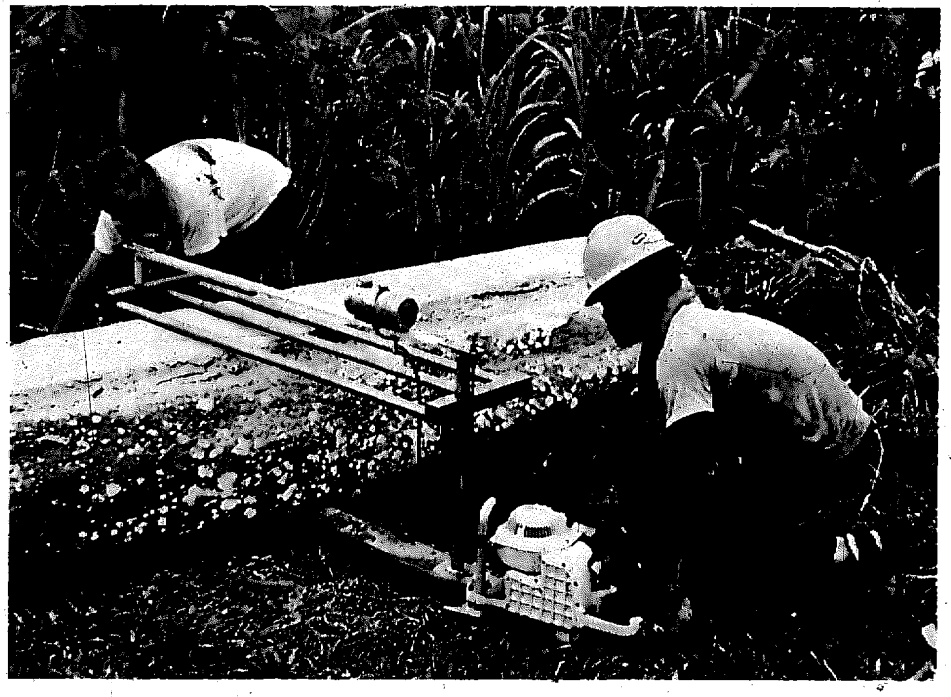
'This workshop is based on LEARNING BY DOING. We are making you an offer. You yourself have to find out what you want to do in the various fields and do it! The reason why we brought you here is that there is a need in the villages. What the need is, specifically, we are not clear about yet. When people see equipment they want it. The purpose is to expose you to a wide range of ideas so that you again can expose those ideas to a wide range of people. But you must not think you can photocopy what happens here. You are leading men in your provinces. You are the ones who decide and choose from what we are offering you'.

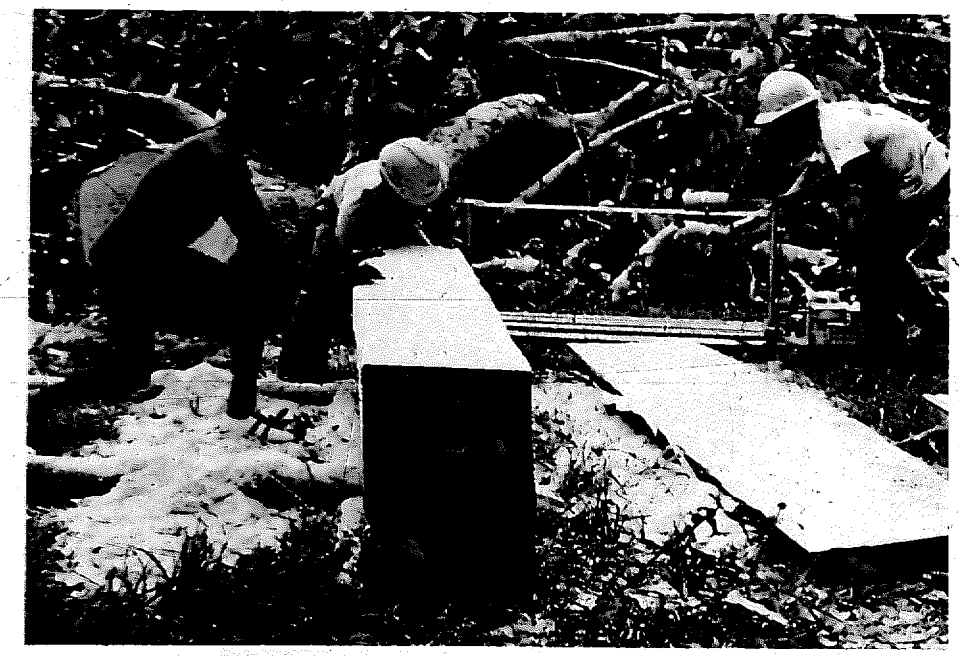
Before we look at some of the demonstrations we should try to remember what the general experience is of extension work all over the world. We must realize that in a demonstration situation the villagers' expectations and hopes are rather high. It is a mood which is brought about partly by the invitation to attend and partly by the gathering itself. People expect to see impressive methods and machines before they will even think of changing their traditional ways. People may be illiterate and the function of a particular technology may sometimes be temporarily beyond their comprehension, but we must not for one moment forget that people are also very rational in their judgement of things which concern their daily work.

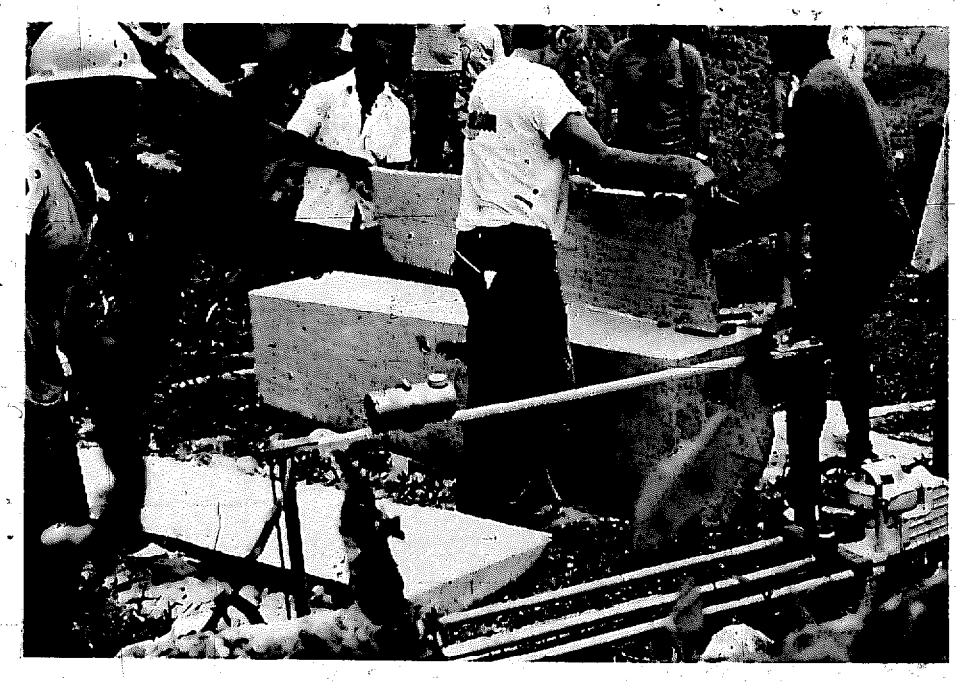
Moi Avei said during his talk to the workshop participants: 'Village people want to see results from an appropriate technology. If there are results, they will adopt it.' I believe this attitude was valid also for the mostly well-educated participants and coloured their reactions.

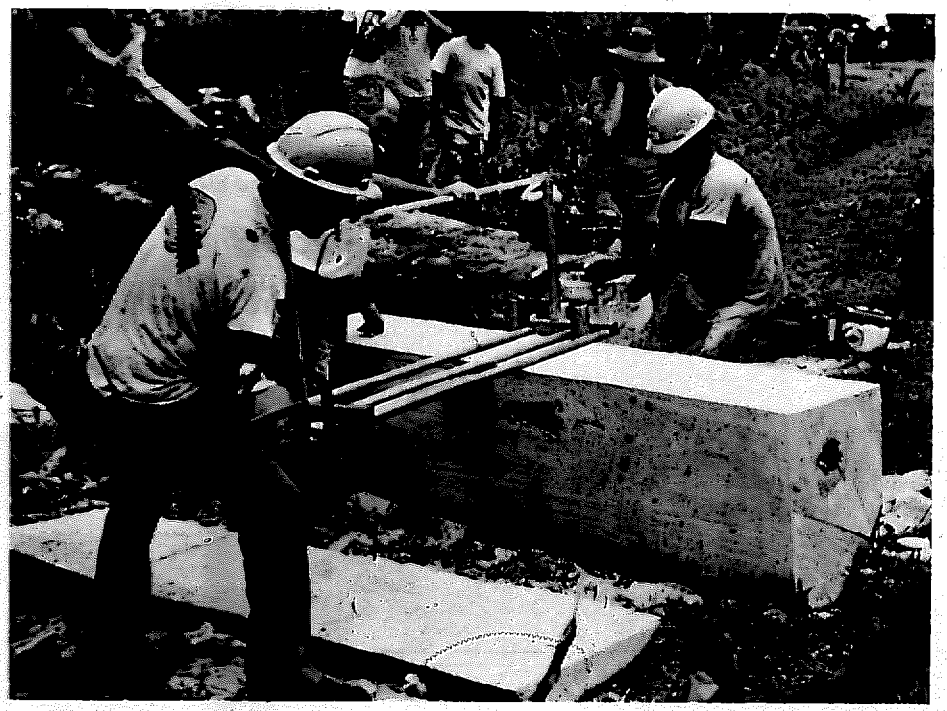
The question may be: what sort of technology do we need? Or it may be: what sort of technology do we want?

The snarling chain-saw was a very impressive tool, biting off huge chunks of the stem in seconds and felling the whole tree in a few minutes. People came to the demonstration from far away. They could hear where it was going on.





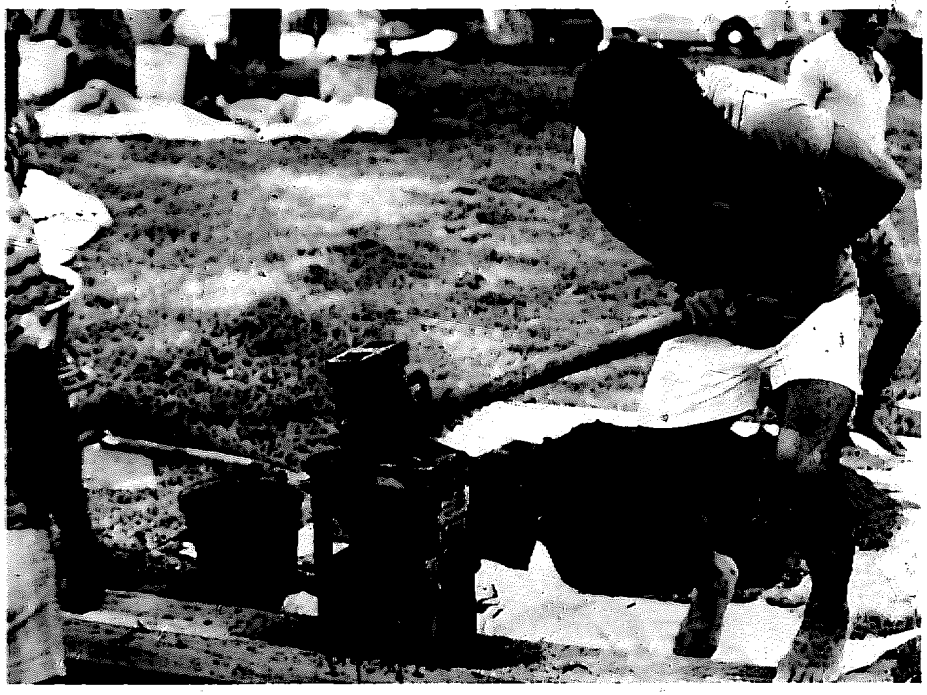


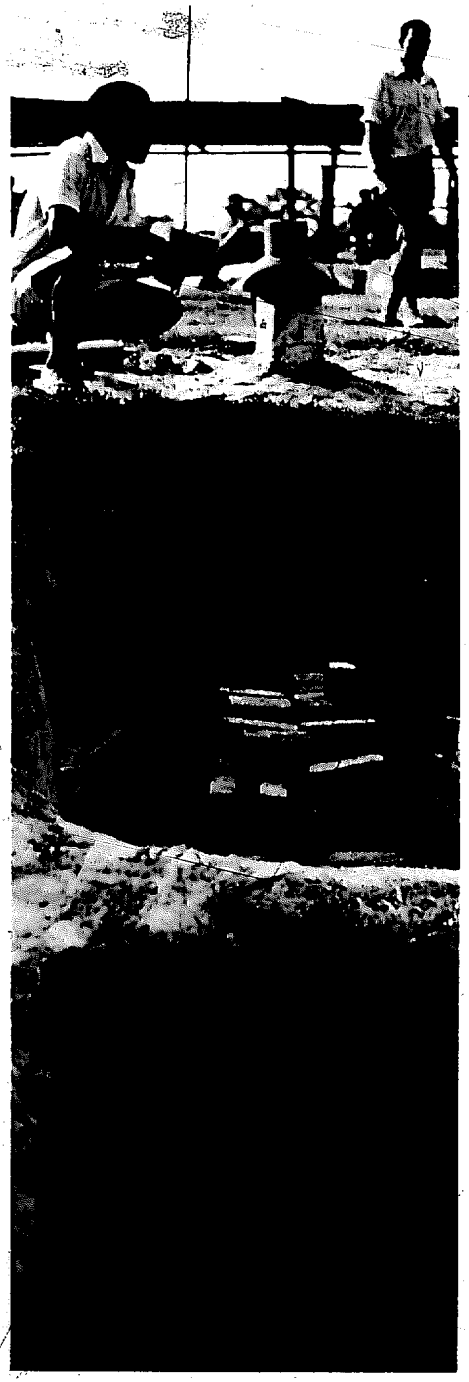


When you cannot bring the logs to the sawmill, you can bring the sawmill to the forest. And that may be an advantage in a forested but roadless country. This little portable 'sawmill' with two men produced its first plank in less than an hour. A small unit costs about 600 kina, a bigger unit about double.

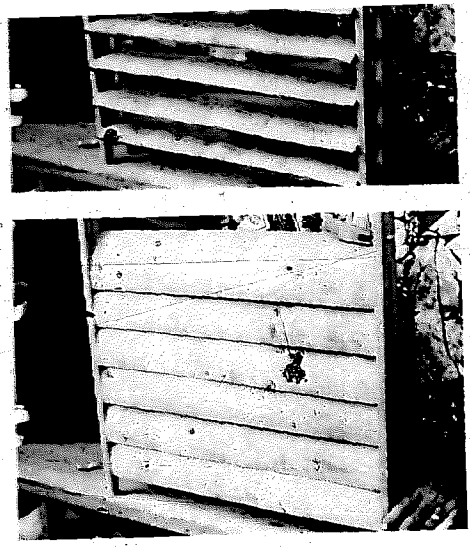
Brick-making is a long, labour-intensive process: finding the right type of clay, transporting it to the spot, drying and mixing it to the right consistency and finally packing and shaping the bricks in the mould. After that, sun-drying again. At the same time the kiln is being built and firewood is collected. Then the kiln is filled with bricks, covered and ultimately fired. The most exciting moment comes when you open the kiln. The quality of the bricks depends on a painstaking preciseness at each stage.

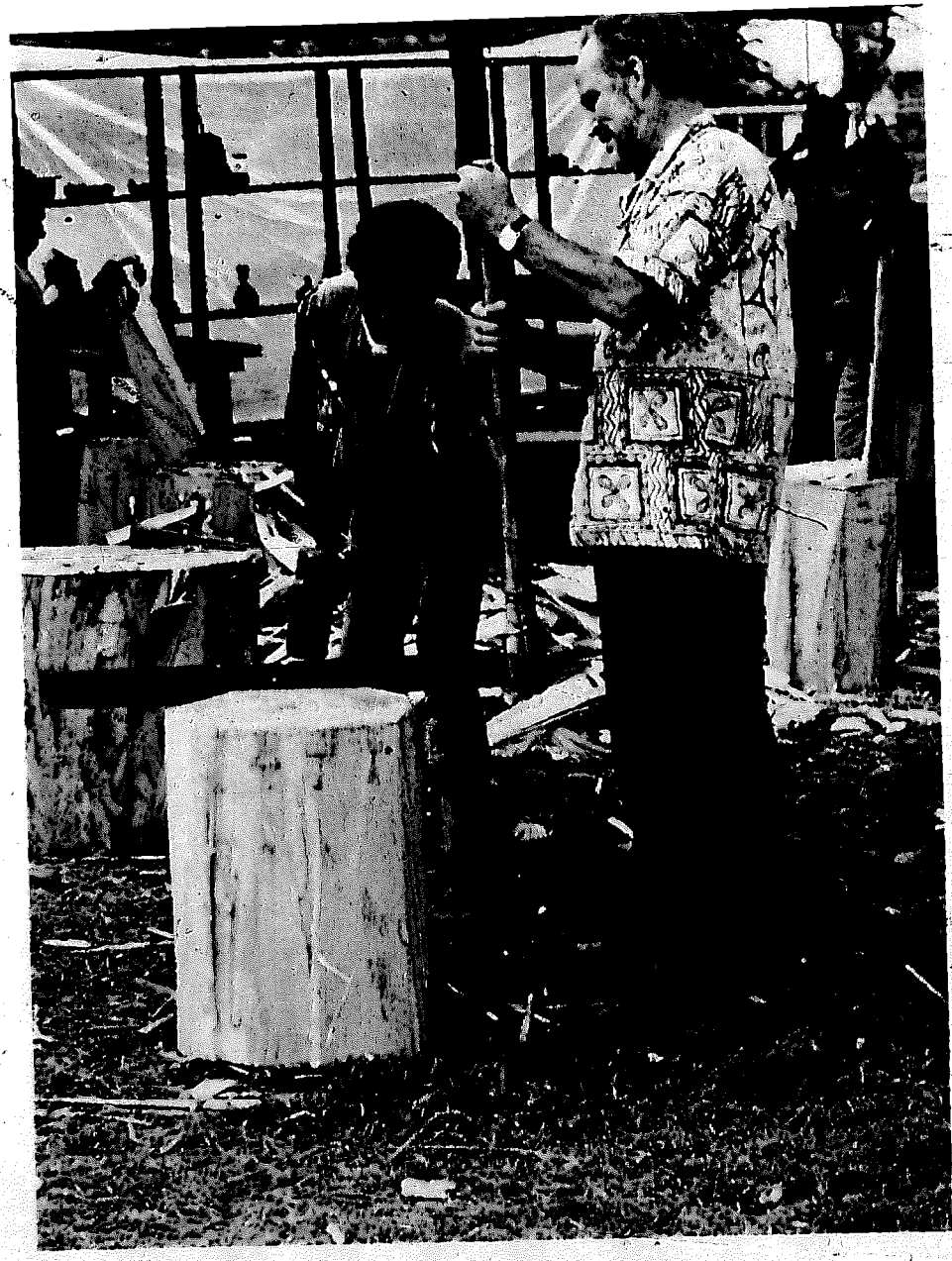
Bricks were also made by other methods.





To improve village sanitation and reduce risks of disease will be an ever more important issue as the population keeps on growing. A toilet house can be made entirely by local materials. Selection of location requires some consideration. Not everybody would use shingles on the walls of the house, but they were at least demonstrated as a good durable cover.

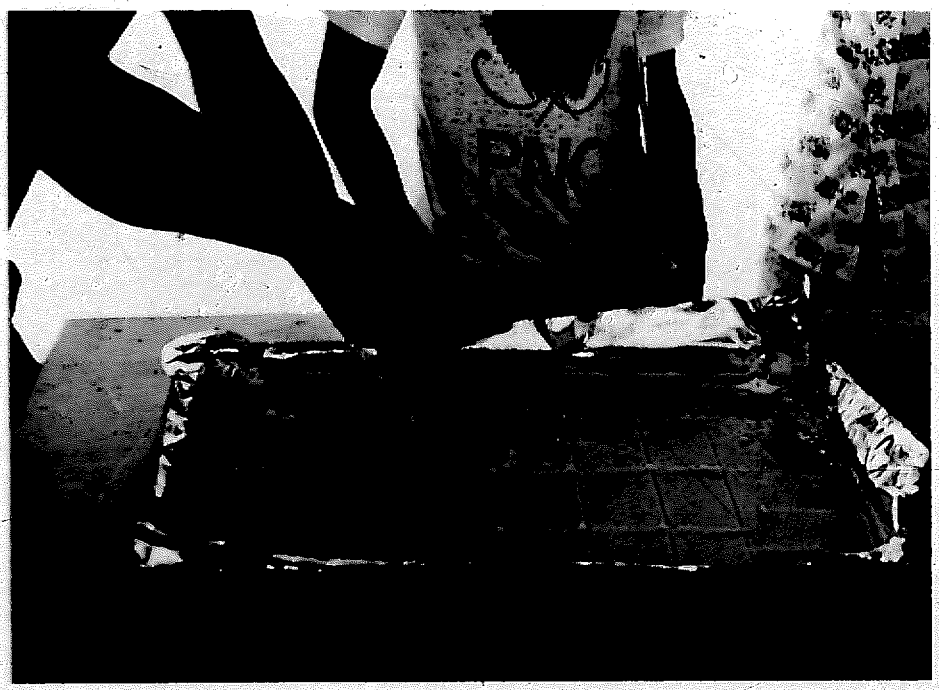


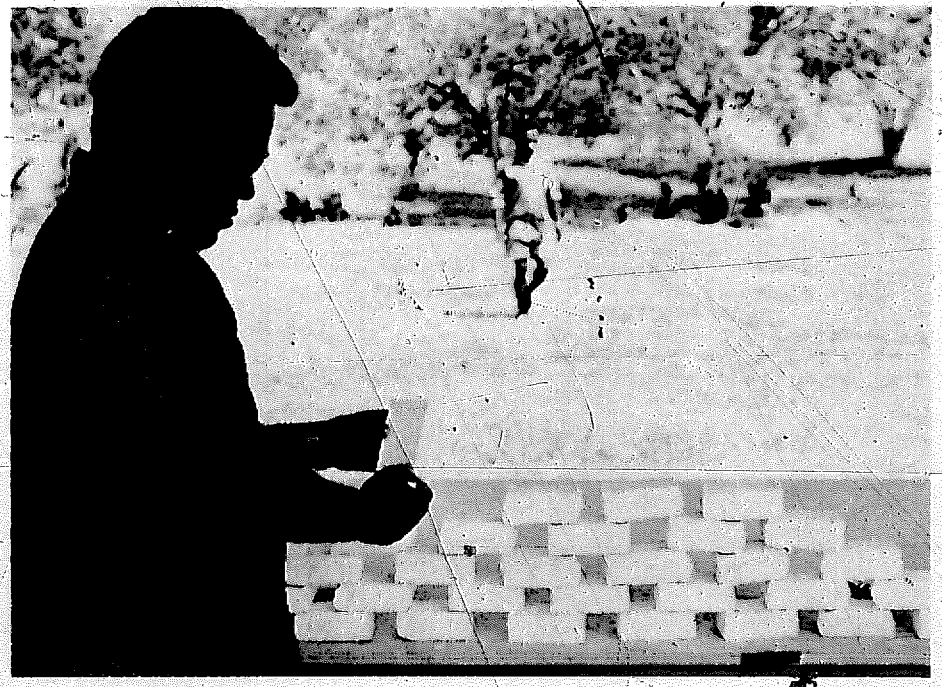


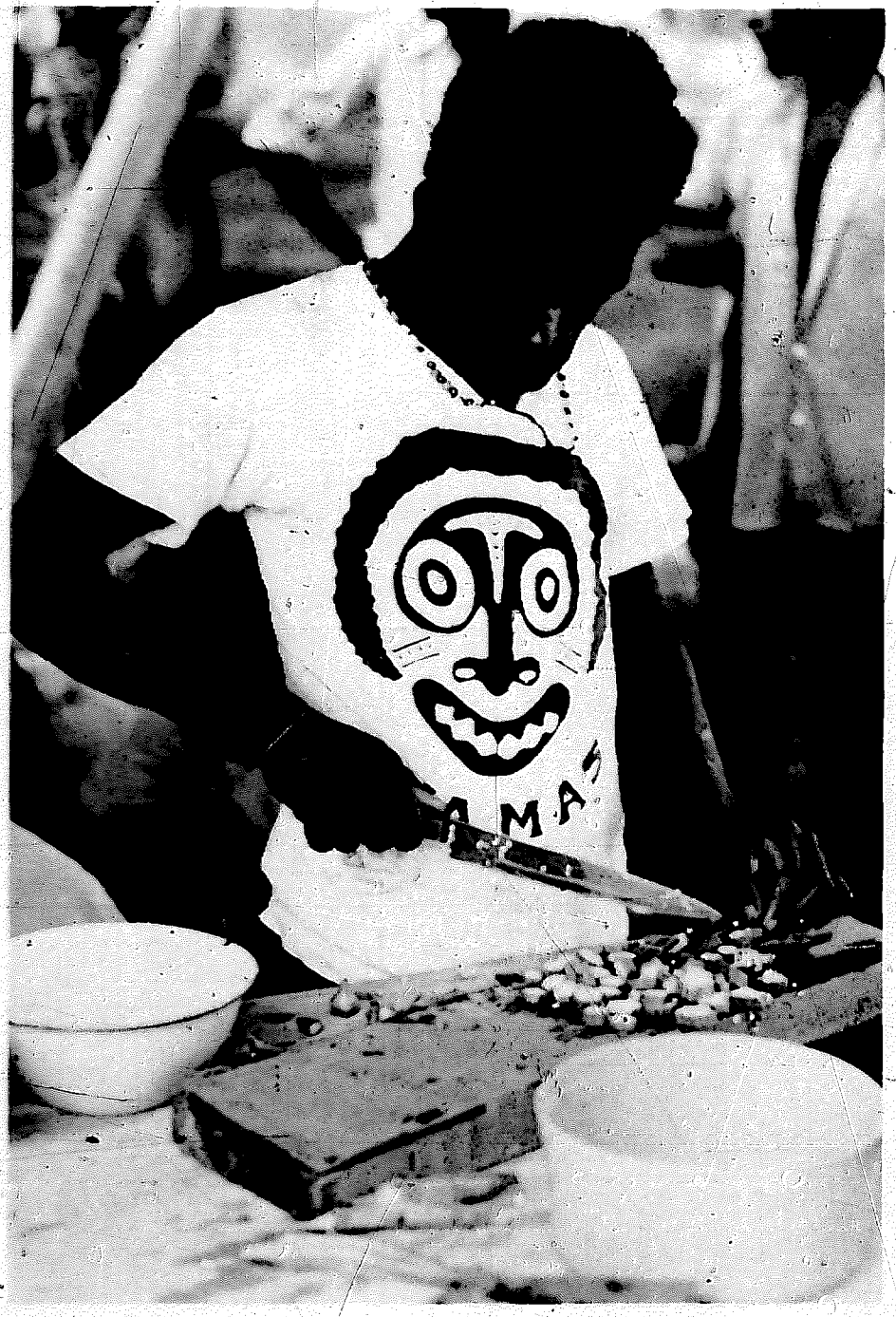
Equipment for the production of shingles is simple: a wedged iron with a handle, a sledge-hammer and a bushknife—all tools which can be produced by any village blacksmith. Particularly if they are preserved with chemicals, shingles provide long-lasting roofing and sheeting for outer walls. Shingles, if carefully cut, can be used even for the more refined housing details, such as window shutters.

Soap-making does not even take much labour. All you need is some caustic soda and coconut oil. The proportions are: 12 cups of oil to $2\frac{2}{3}$ cups of caustic soda; you need, in addition, 3 cups of water. You also have to make a wooden mould and it must be made tight one way or another.

But soap is a low-priced consumer article which moves fast and wide in the commercial distribution networks. Can you compete with the soap factory in the city?



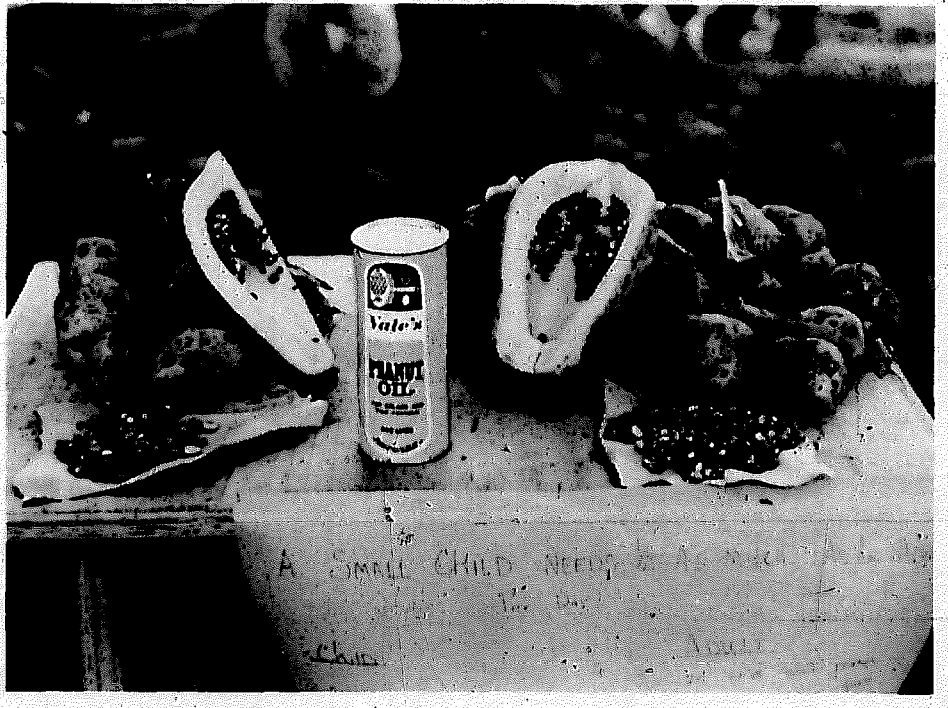


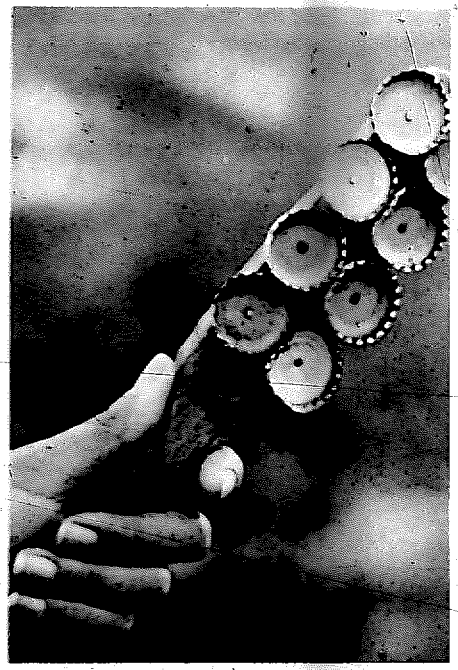


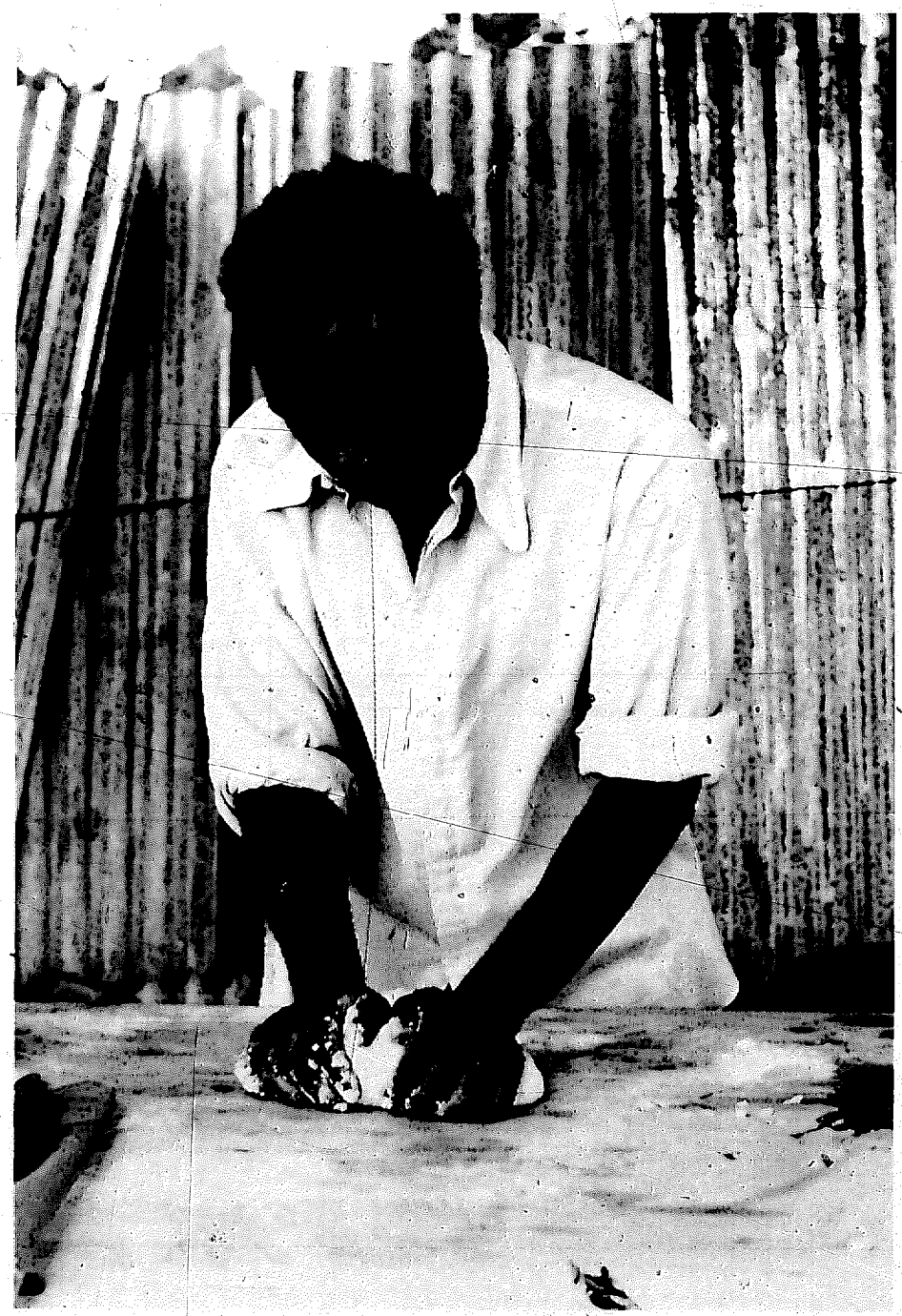
Nutrition is not a question of appropriate technology, really. It is a development issue in itself. Even if exact statistical figures are hard to obtain, there is reason to believe that certain provinces in Papua New Guinea have very high infant mortality rates, comparatively speaking, and that the main reason for this is simply malnutrition.

There is enough food and good food to remedy the malnutrition problem. Jean Eng, regional nutritionist, puts it this way: '...the entire problem revolves around the fact that the people are not aware that it exists.'

How many parents, even among so-called educated people, know that a small child needs half as much food as an adult?

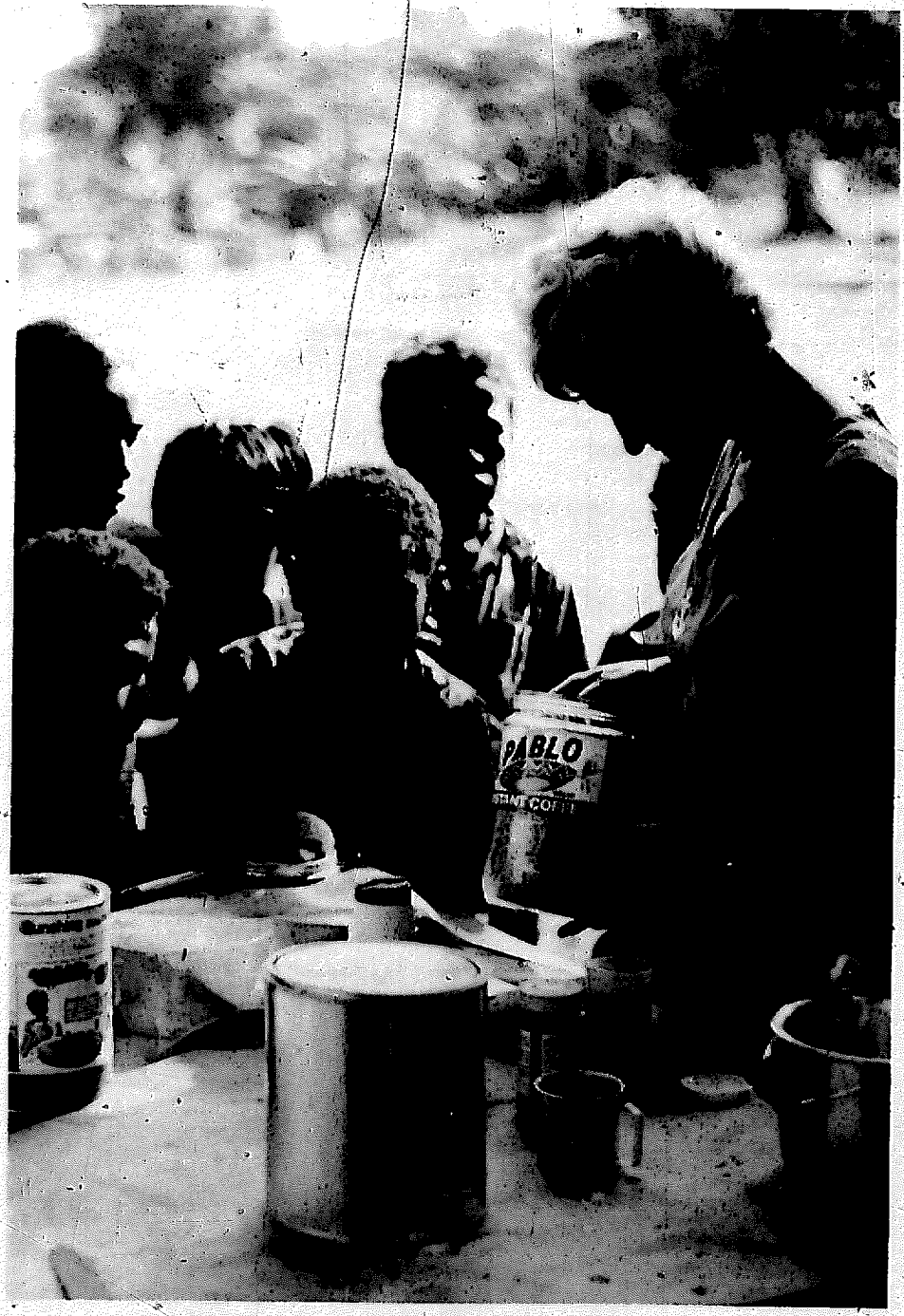






The nutrition field involves some technology, of course, like a 'brush' for shelling fish, a drum stove for smoking fish, a stove for baking bread and for example a peanut roaster for an open fire. Food preparation and preservation are of prime importance in hot climates.

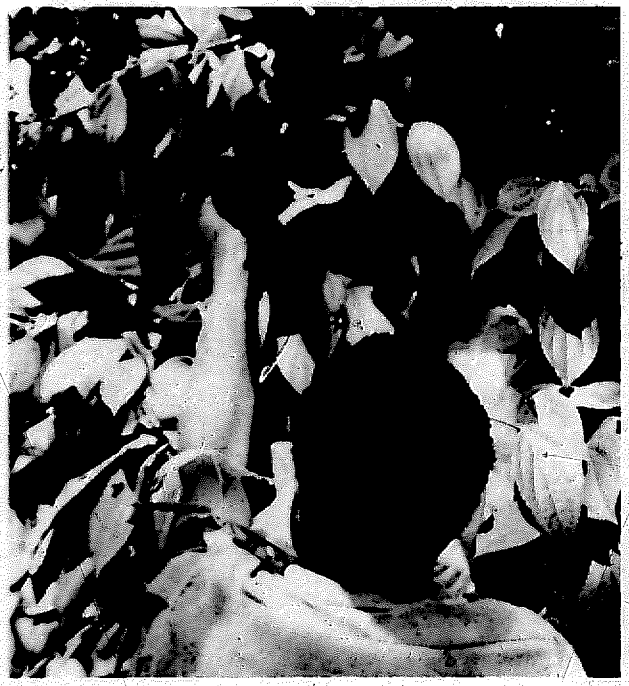
Why are the boys bigger than the girls? Because they are fed better! In Chimbu, which has limestone and shallow soil, the malnutrition among children is worst. Food takes care of hunger! No, it also takes care of growth!

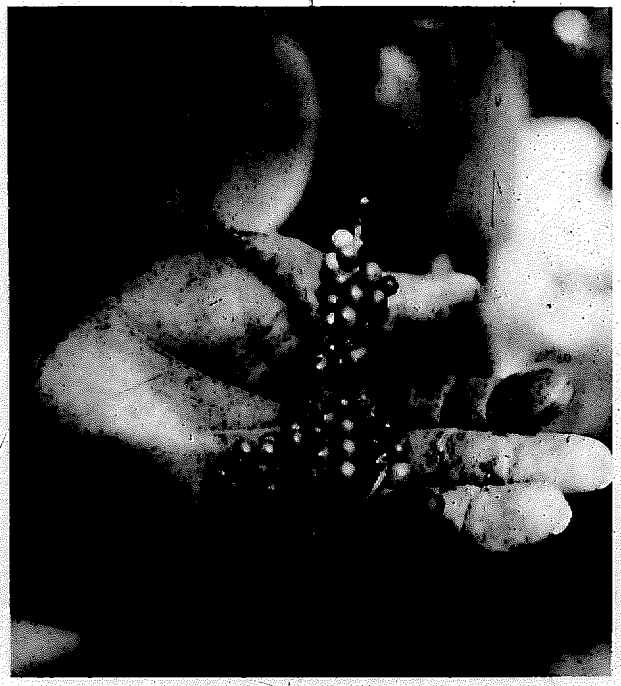


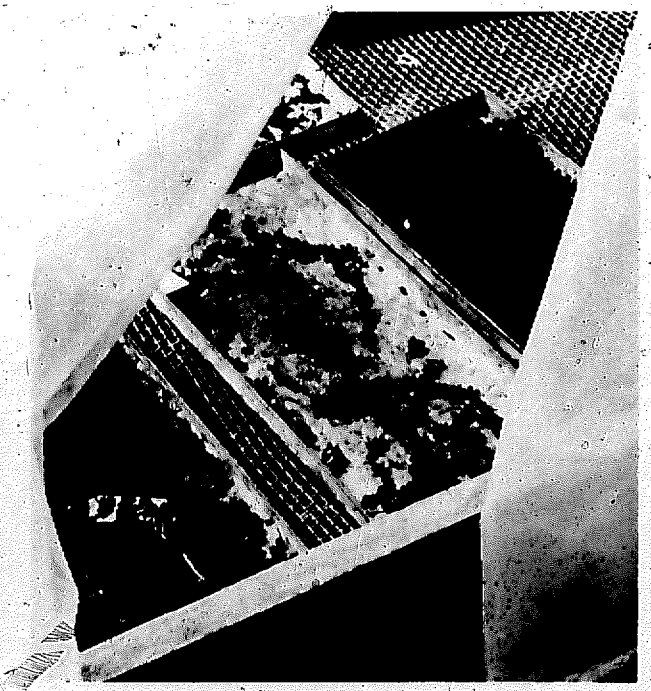
Bee-keeping and honey-processing are well suited as a village small industry. The technology is simple: The cultivation and processing of pepper can also become a substantial source of cash income for small-holders. The pepper berries are retted in water and sun dried after the skin is removed.

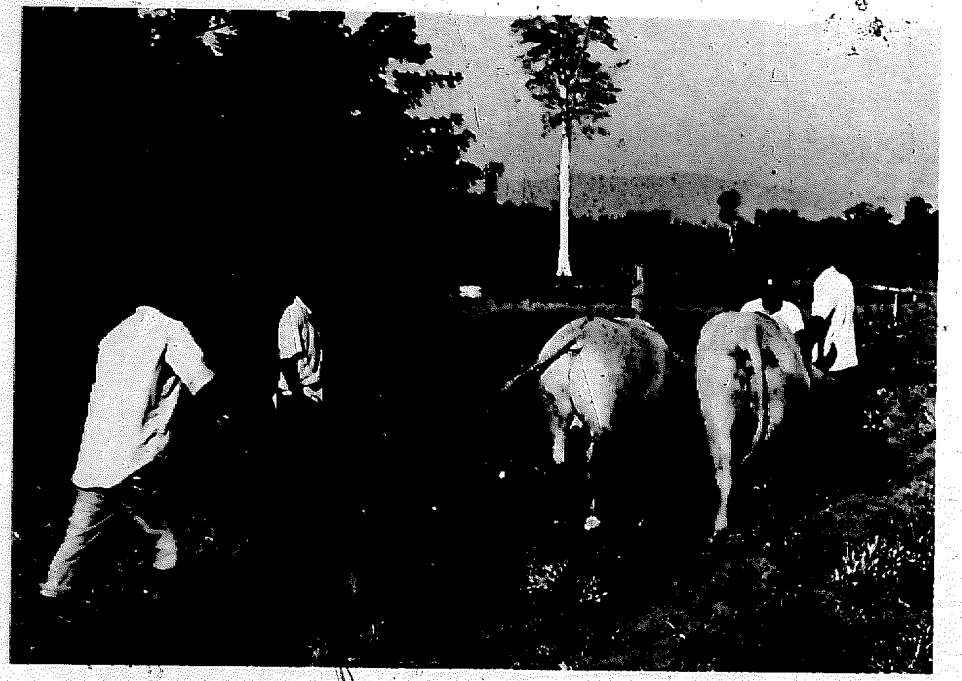
The buffalo can graze in the coconut plantation and save you the labour of clearing. It does not need petrol and spare parts, but it has few sweat glands and must have water to roll in. Accustomed to flat swamp land and shallow ploughing, you cannot take it into hilly country. If the buffalo kneels and does not want to pull, well; then you'd better know how to train it..

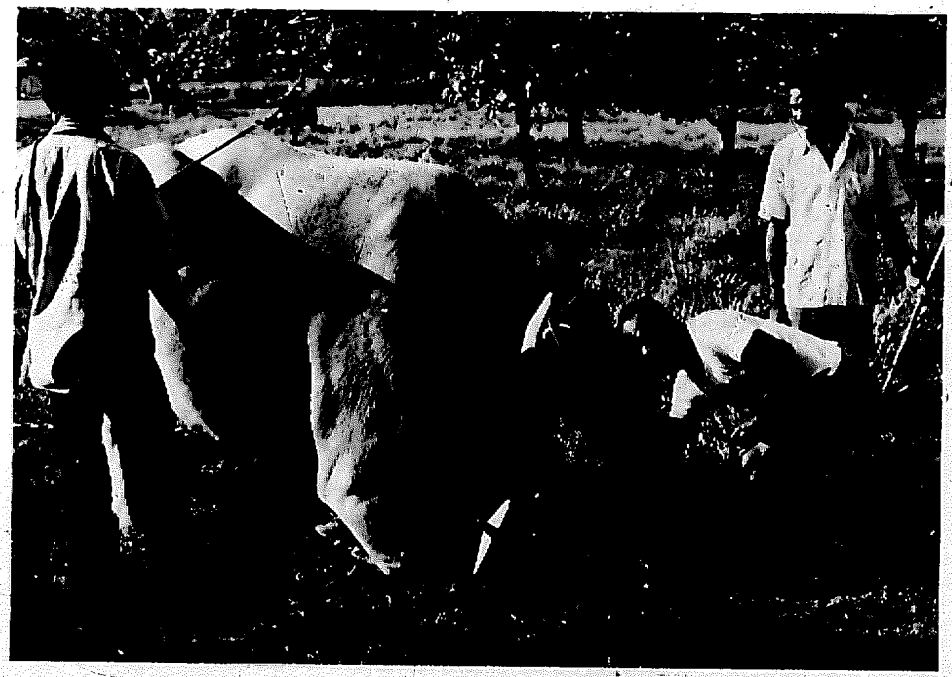
Mixed crops are a method for more rational land use. The coconut palms provide shade for taro or pineapple.

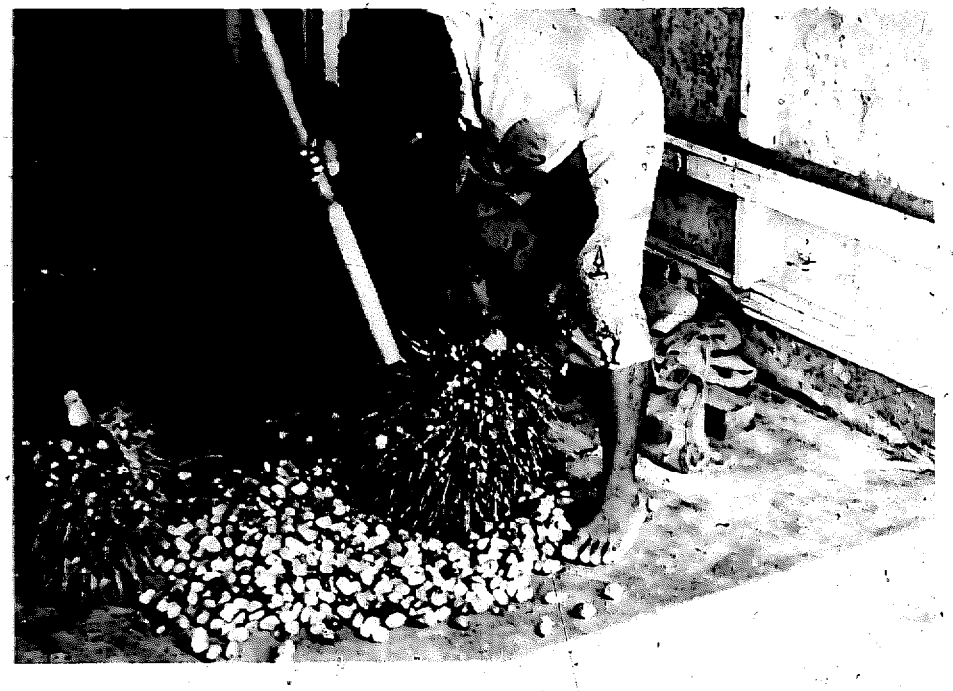


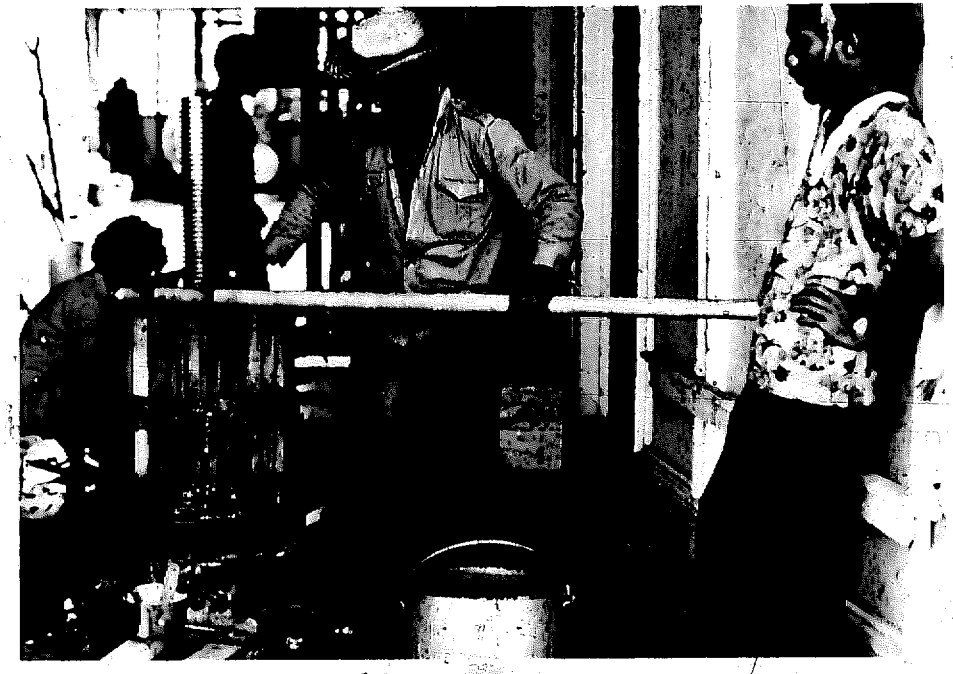


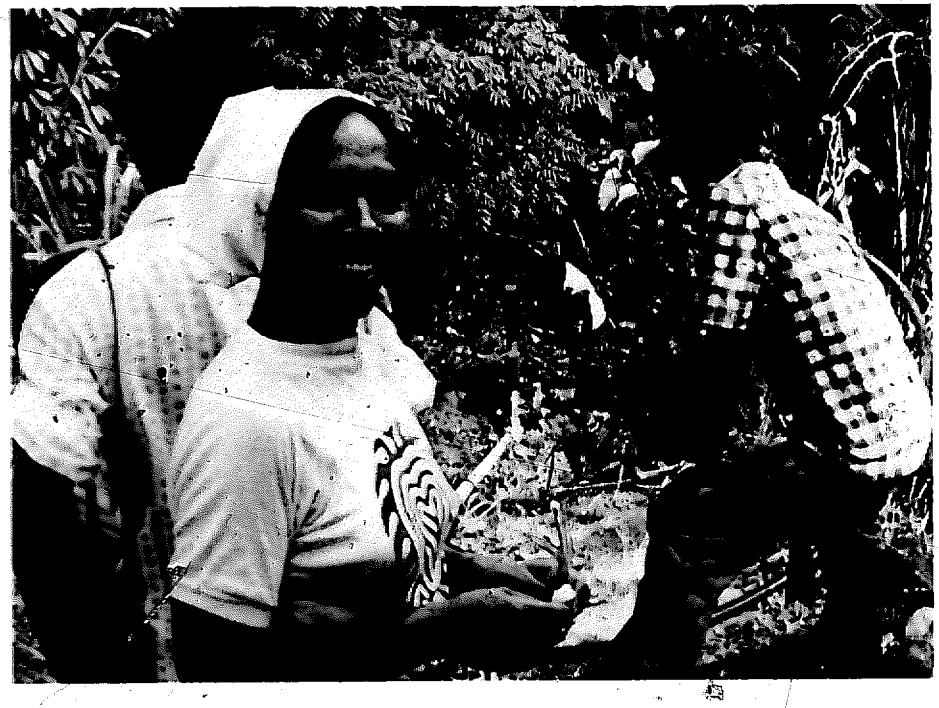












The processing of palm oil is simple but lucrative. Eight kina-worth of husks gives you eighty kina-worth of processed oil to sell on the market. In addition, palm oil is very rich in vitamin A and good for cooking.

Jean Kekedo is convinced that the hydraulic ram pump can give villages better water supply. It has few moving parts and great lifting power, if there is water enough.

After having seen so many demonstrations, tried so many tools and simple machines and above all after having put in so many hard hours of work in learning new methods by doing them—what were the reactions and feelings of the participants?

In a sense the workshop put the participants in the position of the farmer who keeps on sharpening his tools and preparing his equipment but who never gets down to agriculture. Frustrations surfaced, sometimes expressed by the odd disappearance of a participant from the project work, sometimes by tense remarks during the evening discussions:

'Why should we introduce these foreign ideas in the village? We have beautiful ways of doing things. My Mum can make a clay pot without a pottery wheel. If people want a foreign grinder, they must have money and they don't have that.'

'People always ask the government for money. That is the opposite of self-reliance. People have always gathered money. Before, they gathered pigs or shell money. Now they hide away paper money. There is enough money in the villages for people to pay their own development!'

'Most of this stuff is not relevant for the participants, that is why some don't work on the projects.'

'We don't complete one thing, but fly around and do bits and pieces.'

'I can't cope. I hate the projects.'

'The projects will never be successfully finished. I suggest we should have only one hour lunch.'

'I don't mind this technology. I learn from my colleagues.'

'We haven't had enough information in advance. No people in my villages have asked me about appropriate technology. I doubt if people know anything about it!'

'Why did the organizers fail to get a woman into the instruction? They do the agriculture!'

'We must continue with the projects. We can't swap around now.'

'Why are we here? We ask the same question every evening.'

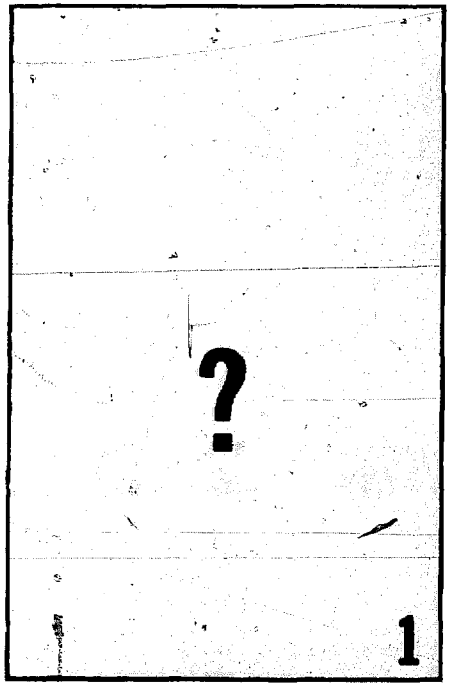
'Truth is the daughter of time. Let us read the whole book. Let us be patient and see.'

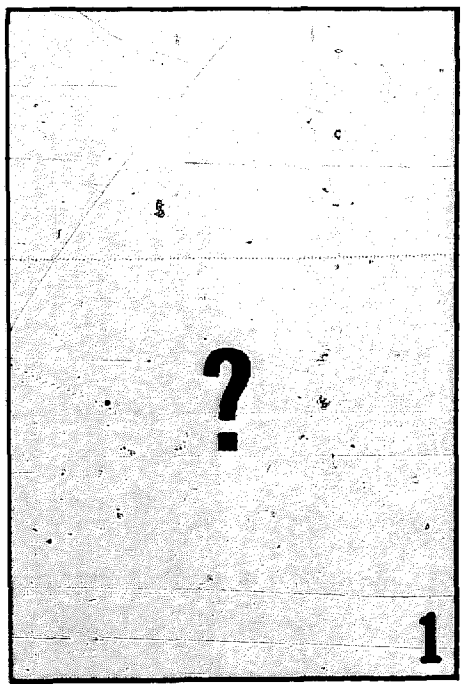
In spite of the painstaking and systematic effort the organizers had made to inform the participants in advance, it was evident for a participant observer that the concept 'appropriate technology' had come to them like a new slogan. Everybody used the two words continuously, but many could not come to grips with it in their own frame of reference. Moi Avei put the problem in a deeper perspective by asking two questions:

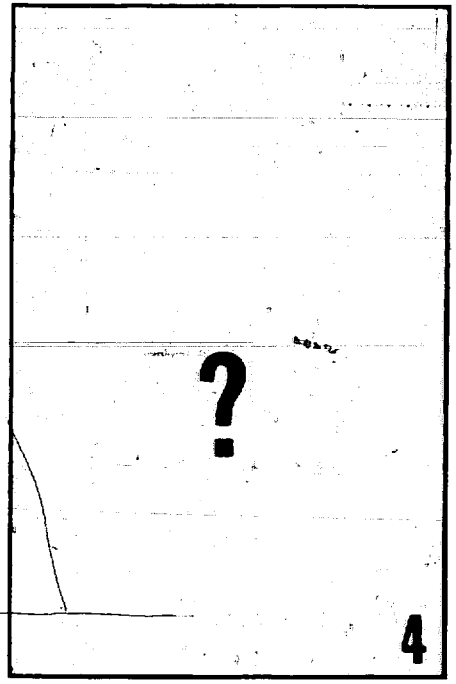
'In what sense is a man walking barefoot inferior to a man flying superjet? To accept village technology does it mean to accept a different political ideology?'

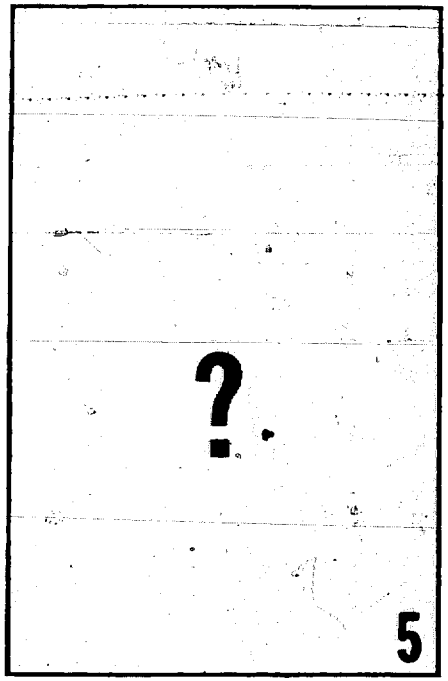
What was the reason behind the participants' apparent unease and confusion? Was it that some instructors were not expert enough and therefore some of their demonstrations failed? Or that material or arrangements for demonstrations did not fall into place in time? Or that all the projects were not completed by the end of the workshop? Hardly. In terms of logistics and instructor capacity, the workshop was a big undertaking which the organizers had every reason to be proud of. What we have to recognize is that in spite of all its practical demonstrations, the workshop was an abstraction from reality.

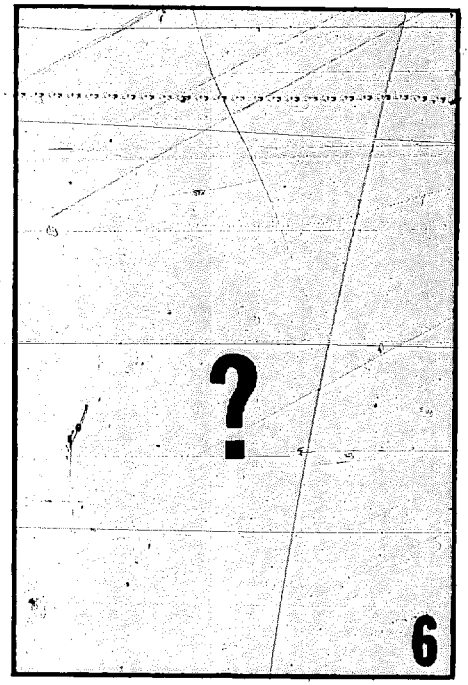
The participants were introduced, for example, to a few stages of the process of charcoal-burning. The limited technical function was torn out of reality and because that function is so conspicuous, people get preoccupied with it and do not really perceive the preceding and succeeding stages. Charcoal does not smoke, it burns steadily and gives steady heat for a long time. It is excellent for cooking and easy to carry home. But the process is only a small part of a wider continuum. First, what are the needs in my district? What are the forest resources? What are the cultural habits? Is there an economic base to start a small industry? Or is the process worth while for home consumption only? And second, what are the consequences—in the short run and in the long run? There are many preceding and succeeding stages which are not seen.

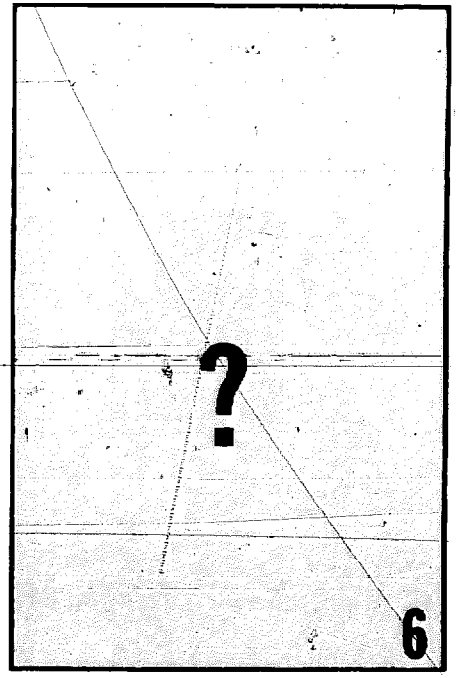












There are many conspicuous details to observe in timber preservation. The bark must be knocked off with wooden sticks. The absorption process stops in the areas where a knife or axe is used. One pound of copper calcium salt per gallon of water makes an extremely poisonous solution which must be carefully mixed. The logs must stand for seven days, being turned 90 degrees every day. The method gives preservation for up to fifteen years. But again the few stages which are demonstrated are torn out of a larger context. What are the possibilities of distributing the poisonous chemicals in remote rural areas? Can people be taught to handle them carefully? What are the economics of the method? Etc., etc.

What is appropriate technology? Perhaps it is only a way of thinking and doing things, an idea put into action. Most often the idea is put into a machine or a conspicuous method of some kind, a tactile tool, a handle to hold on to. The technology itself is so conspicuous that it comes between us and the wider perspective. The practical demonstration, the example you use to communicate an idea, becomes the thing itself. In other words: the medium becomes the message. We focus our perception on what is concrete in front of us and do not see the abstract behind it. We tend to be more attracted by the smart looks of a bicycle than by the idea of cheap and convenient transport. This is a phenomenon related to what is called conspicuous consumption in affluent societies. It leads to creation of false needs. Such a thing must I have too!

I am inclined to think that many of the participants were confused and frustrated because they did not see that the real purpose of the overwhelming presence of appropriate technology was to give them a wide range of appropriate ideas, i.e. to trigger off in them a process of *thinking appropriately*. The question is whether physical demonstrations are the only or the best means to do that. The participants experienced many things as irrelevant because they did not get the opportunity to relate what happened at the workshop to the larger context in their districts or villages. The educational and practical problem is: how do we fill in the empty frames so that we get a *comprehensive* perception of the usefulness of technology A in situation B? It is important to train people in making bricks, but isn't it equally important to train people in making good observations? The important factor in appropriate technology as a means to self-reliance is not so much the process of idea duplication as the process of creative expression.

Monday evening, 4 October, was devoted to a discussion of the role of the 'facilitators' in village development. What was the meaning of the word facilitator? What should facilitators do and what should they not do? The participants were supposed to explore the meaning of facilitators as change agents and to discuss their own role as facilitators. It must be admitted that the discussion revealed some ignorance on the part of the participants. Although many of them to some extent knew their role in village development, in practical terms it seemed as if the concept of the facilitator was totally unknown to them. Attempts during the discussion to clarify the major principles of village development work were futile. This happened in spite of the fact that most participants were educated at colleges teaching agriculture, community development and other typical extension subjects. This extraordinary situation probably derives from the simple circumstance that such institutions concentrate on teaching specialized knowledge of various kinds, but teach the students nothing about how to communicate this knowledge in the villages. All over the world the situation seems to be the same: extension methodology, animation technique, the role of the facilitator, whatever it is called, is a little-explored concept. One of the major reasons may be that we can hardly scratch the surface of this problem area before we discover that the implications are mainly political. Here, indeed, is a task to be undertaken. Relevant observation and appropriate thinking are primary abilities for a facilitator or animator.

Learning by doing is a method which sometimes has its limitations. People generally do not want to do things unless they need to do them. An advance assessment of people's needs therefore becomes the means by which the facilitator can make the learning situation more relevant and meaningful in the village. It is true that sometimes people may not know what they need, but it is equally true that people only adopt new ways if they see results they can use. What can we do to screen the ideas so that appropriate-technology demonstrations become more useful to people? Is there a gateway to at least a preliminary assessment of people's needs?

Clearly, research studies on consumption and use are a possibility which should be tried out systematically. But there may also be interesting information available from existing sources.

Even if we dislike generalizations Roy A. Rappaport's study on the flow of energy in the Tsembage society (14) is of striking importance for a relevant discussion on people's needs. The Tsembage tribe is located in the Central Highlands of Papua New Guinea and their method of agriculture is transient cultivation. A clearing is cut in the forest, the cuttings are usually burned, a garden is planted and harvested and the clearing is then abandoned to the returning forest. Sometimes the clearing is planted two or three times before it is abandoned. Rappaport

measured people's input in the various types of work connected with the gardening and established the following percentages:

Clearing	14.0	Gathering/planting	7.0
Fencing	6.0	Weeding	31.0
Burning, etc	3.5	Harvesting	15.0
Soil retainers, etc.	2.5	Carting	21.0

The refinements of the study are not important here, only the indications of people's needs that the figures give. This is, indeed, the oppression of the woman quantified. Clearing and fencing is heavy work done by the men but otherwise the gardening is loaded on the women. Weeding, harvesting, carting and the rest of it are their duties. Backache is a typical woman's disease in so many Third World countries.

One must envisage that the needs for appropriate technologies are greatest in the areas where the work input is heaviest. An improvement, in, for example, the methods of weeding or carting should lead to an improvement in the quality of life of the woman. One would assume that in a situation of limited resources the successful introduction of appropriate technologies depends on an approach of setting clear priorities. But one must fare cautiously. People's insight into what they are doing and how they are doing it is very pronounced. The Tsembaga woman does not weed out the tree seedlings. They are even protected in the garden. They are called 'duk mi'—mother of gardens. Allowing them to remain and grow avoids a grassy stage when the garden is abandoned and ensures a rapid redevelopment of the forest canopy. The young trees also provide webs of roots that penetrate deeper into the ground than the roots of the crops and are therefore able to recover nutrients for the top soil which might otherwise be lost through leaching. The woman in the garden is part of a balanced system. To define the felt need is a complex matter.

The village population survey (15) is another source of information of interest, although a relevant interpretation and evaluation of the data depend on considerable knowledge of the local conditions. An extract illustrates, for example, these contrasts in needs:

Province	More or better roads	Better water supply	More or better aid posts	More or better schools
	%	%	%	%
Central	64	8	8	12
Northern	25	11	6	31
Western Highlands	48	13	5	13
Madang	67	10	1	7

Again, a detailed analysis is not called for here. The main point illustrated is that the provinces vary in their level of development. It follows that a national policy for the introduction of appropriate technology should be planned in relation to the specific provincial needs.

Figures like the foregoing confirm the conviction that a system of priority ratings must be developed before a national policy for appropriate technology can be meaningfully defined.

DOING THINGS TOGETHER

It ought not to be so difficult to preach about the merit of being self-reliant to people who have been exactly that for thousands of years. But it is. What are the characteristics of the various kinds of appropriate technologies we try to introduce? They are all based on the idea that labour is the available resource. So, do they not impose on the labourer a sustained, repetitive and often monotonous effort over a long period of time? These new technologies shape a new life style for people.

How does that go with people's own life style and technology? What are the characteristics of people's own way of working?

Jim Tyler says this about the village technologies:

'There are a number of striking features. One is the richness and diversity of types of village technology practised throughout the country. Another is the ingenious use of materials from the immediate environment. A third feature is the gentle nature of the technology on the environment. Nothing is exhaustively depleted—everything is at hand—little is required to be imported—all of it is handmade. Finally, throughout the happy community nature of many of the technologies shines through. They can truly be said to be village technologies. An intimate view of the extended family in action is given in many of them. There is much more joy in trapping fish than going to the tradestore to purchase the costly tinned article.'

What is the psychology of this? Is it the individual achievement, the competition which counts? Or is it that people are DOING THINGS TOGETHER? Sir Maori Kiki says it this way:

'When I was a boy people did everything together. They used to rely on a leader called KARIKARA KIVA HAELA—he who takes care of the village. The leader was not elected, but simply one who had proved to be an efficient person. When he said, "Today we shall go and fish", we went out and fished.'

Does it have something to do with leadership then? Did the traditional leadership just lead people by the quality of its performance? And the new leadership—does it just give instructions and organize the village to do work for the government? Moi Avei says it this way:

'Before the imposition of colonial rule, the village was, as it were, "the source of life". That is, the will to work and struggle, to share, to celebrate, and even the moments of suffering drew their meaning and significance from the context of the village. In concrete terms, all forms

of human expressions from the spiritual to the routine organization of productive labour had an integral place within the bull-ring of village politics. Real power resided with the villagers or was within easy reach.

'There is now a radical departure from this, as foreign forces generated over the period of seventy years of colonial rule have imposed a new basis or "source of life". It is the sacred institutions of foreigners, the schools, aid posts, local government systems, the church and glamorous urban life which now sets the pace as well as generates the inspirations for all forms of creative expression within our society. The village is now seen as a hollow space where people actually reside.'

Does appropriate technology perhaps have something to do with people's creative expression? And is that perhaps again linked to people's ability to do things together?

Stephen Toivita said it this way:

'We should keep Haus Tambaran as a community house where people discuss and decide. In Haus Tambaran they decided for example to go on a trading expedition to a neighbouring village and they went under the direction of the clan chief. This direction does no longer exist.'

What was actually the process by which people in Haus Tambaran decided? Was there a village democracy and how did it work?

During one of the workshop discussions, an anonymous participant made this significant statement:

'I do not like to have a chairman. I am from the village where everybody talk and they are old enough to know to talk the same thing. We are not talking the same thing here.'

I have worked in small village communities in other parts of the world. They are very much the same. It seems as if village democracy is a much more subtle process than that of electing a chairman and representatives and making speakers stick to an agenda. People—or rather the men—come together and discuss the matter. The skill of the leader is his sensitivity to what the consensus is. He proposes an action: 'Today

is a fine day for fishing.' If his observation of the conditions for the action and his interpretation of the consensus is correct, he is followed by the village. If not, well, then of course he will not be followed and if he repeats such failures he will probably not be the leader of the flock for very long either.

This is a social institution for decision-making which is very efficient. It is much more time-consuming than taking a ballot, since the ensuing action itself is the expression of the vote. But perhaps the results are better. If this view is correct, the system of democracy is practical and operational. From the point of view of the survival of the village community it seems ideal. It does not allow for the formation of a troublesome power structure above the common man. My experience is that village people have invented the most profound way of doing things together. The question is whether and how appropriate technologies can fit into their life style.

There is no doubt that the many modern developments are tearing their life style apart and village people are concerned about it. They worry. The clan and kinship systems are, however, still alive and provide some cohesion in these times of social upheaval and uncertainty and also potentials for new social organization. It must have been the isolation of the villages and the long, lonesome canoe travels which led the Melanesians to extend the kinship idea and invent the Wantok system. Doing things together extends even to those who talk the same language. Wantok does it mean One-talk!?

It is totally wrong to think that the social institutions and the life style of the village are obstacles to development. On the contrary, they provide a starting-point for the development work which is invaluable.

But we have to understand that together with the introduction of any new idea goes the feeling among the people that their old ideas are wrong, stupid or inferior. We must start by perceiving the human terms of notions like developed/underdeveloped. It simply hurts very much suddenly to perceive oneself as underdeveloped.

David Drayeu, village worker in his home village on Manus Island, said it so clearly during one of our late-night talks: 'You see, I go slow with new bisnis. I don't want to hurt my people make them feel they do things wrong way.'

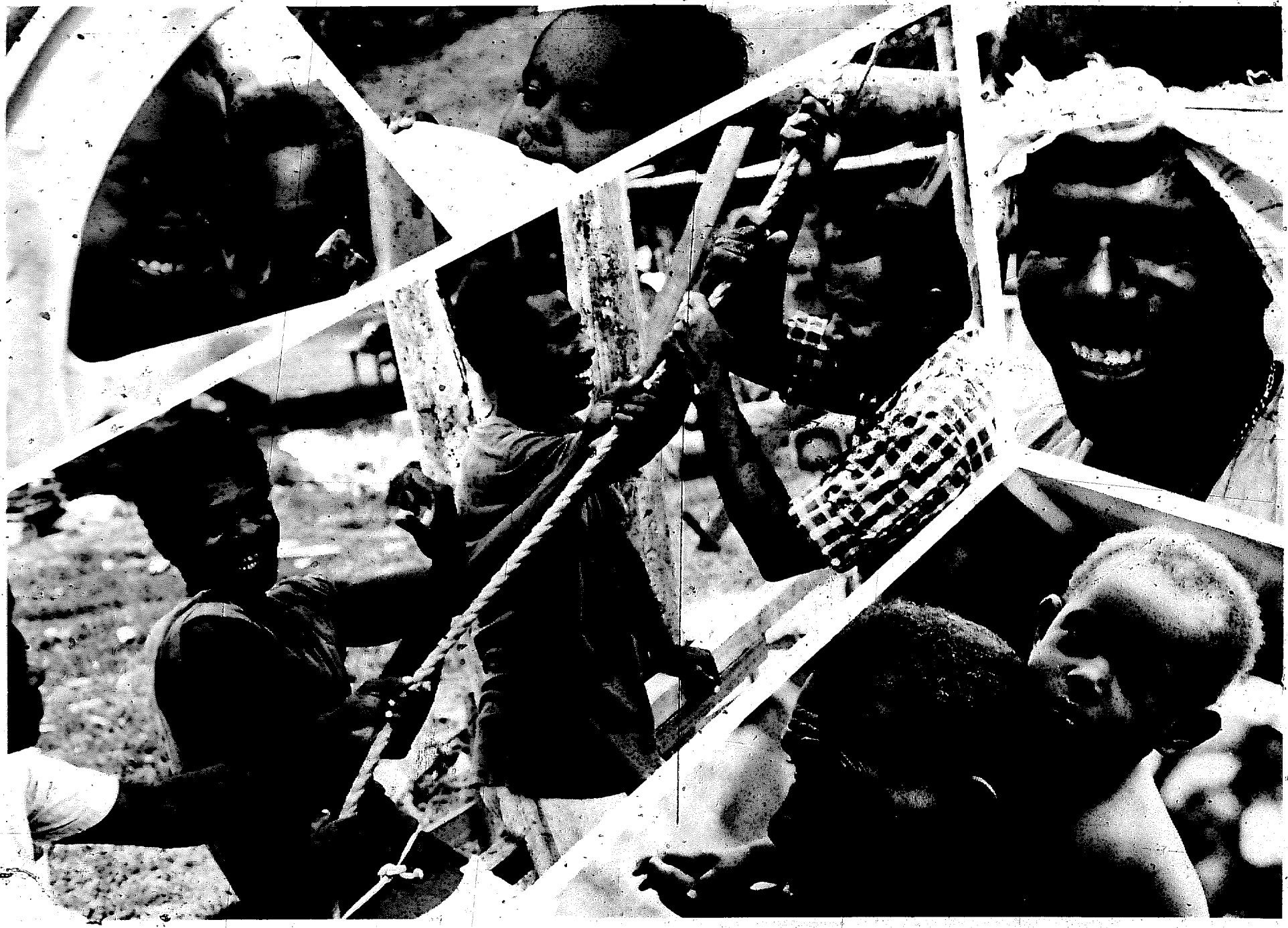
If appropriate technology can improve people's quality of life, how do we go about introducing it in the community then? Is there a method for the extension workers in the rural community? Or is perhaps the whole notion of the public-service extension worker as a development agent in the community a bankrupt reminiscence from colonial times? Before people can do things together they must come together. Is appropriate technology itself a concept which is likely to bring people together? Or is it only part of a larger development effort? Doing things together means much more than the result of the action. It means also the joy of the action, the creative expression and the singsing.

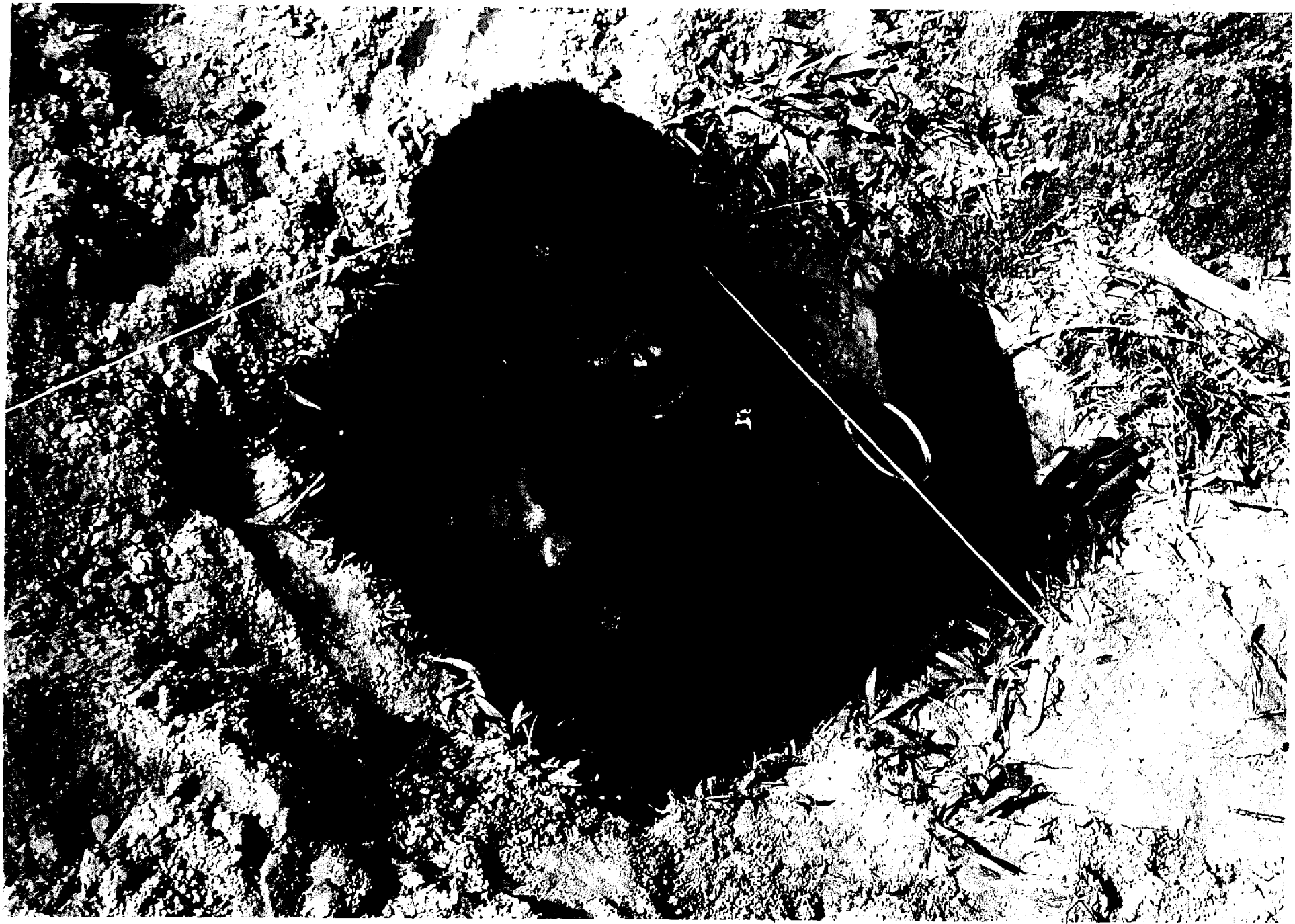
The workshop dealt with the functional demonstration of the technology but little with the joy. It is my experience that, depending on circumstance, almost anything may serve to bring people together, ranging from literacy classes to nutrition demonstrations, water supply or building new roads. To begin with, the important thing is not what brings people together, but that they come together.

Manasa Radrotini, an experienced rural-development worker from Fiji, told the workshop about his experience:

'I start out being with my people during the night rather than daytime when I disturb them. One thing should bring people together, so I start suggesting a community centre to build together. Often it takes long time to decide. When the centre is finished we start run programmes for the young people inside: library, films, dances and training programmes of different kinds. Also church—that makes old people come together in centre. One thing very successful was motor repair of outboard motor. We gave training demonstrations in centre but people have trouble so now we have mechanic who go around in villages and do work and train people. But I think community way fails in farming. Successful farmer has to break out and start for himself. On the other hand then the community hates him.'

The last remark, of course, expresses the field experience of the effect of two ideologically very different approaches to social development.





Building a house together is really an action of psychological significance in the community and may provide a starting-point for doing things together, not exclusively for appropriate technology, but for all sorts of things, whatever the community itself wants to do. But people hardly build a house together just for the fun of doing it. First the community has to go through the often cumbersome process of being convinced of the necessity of the house. In his talk to the participants Graeme Kemelfield outlined experiences from his educational work in Papua New Guinea which tended to confirm these ideas. Here are some of the points he made:

'We are thinking along the lines of a community-based educational system. The present educational system prepares the youth for jobs which are not going to be there. But the parents must also be involved. The idea is a community education centre in which everybody participates. This is also linked up with the trend among intellectuals to go back to the village. Our experience is, however, that the facilitators who come back as "big young men" are running into trouble. The projects which have succeeded are the ones that have been quietly played. The community worker has used the leadership inside the village to lead the developments. One idea comes forward repeatedly in these meetings: the older people are concerned that the modern developments are tearing the community apart. One old villager said it this way: "We fear that government will decide changes which we will not know about till it has happened to us!"

'Eventually people started building the house—and quarrelled. But then the question came up: what are we going to do when we have the formal opening of the building and what are we going to do inside the building when it is finished? Programmes were suddenly discussed.

'We have been using various types of educational material and have started literacy classes and we decided for festivals. New things must happen all the time. People are bored by the regular.

'We want to start out our educational work by making people think. What has happened in the past? What do you want to do now? We used, for example, a slide tape, *The Drop-out*, to make people think about and discuss school. The community has broken apart and has to come together again. What can we do about it? This is the sort of situation in which you can start talking about appropriate technology to people and to talk about organizing village work. But we found that one

committee did not work. We needed three committees: one for ducks, one for community gardening and one for the literacy work. The most important part about literacy is not that people learn to read and write, but that it gets people together starting discussing things, for example the "bisnis of self-reliance".

I find these experiences of how people are doing things together of great significance and we should perhaps particularly realize how much the singsing and the festival are part of people's life styles. Is there a development path to follow from the spiritual and practical function of Haus Tambaran to the present-day activities in a community house? Should appropriate technology endeavour to become an ambitious overall development philosophy or should people carve and colour it their own way and give it the place in the house they think fit? And if some appropriate technology is bloody boring, is not the problem to make it more fun?

TO DO OR NOT TO DO

The public-service officials have a crucial position in relation to the village community. Three important questions are: How do they see their own role in village development? What are the village people's feelings about them? And finally, how does government define the function of the public service in village development?

In their invitation to the workshop, the organizers set the following criteria and objectives for the selection of participants:

1 Participants

Two participants will be selected from each province in Papua New Guinea. In addition invitations will be extended to the Governments of Fiji, Solomon Islands and New Hebrides to send observers.

2 Criteria for selection

People who already live and work in the province.
People with proven interest and involvement in promoting village development in any way at all.
People with interest in the use of appropriate technology to foster self-reliance.
People with the ability to communicate information and ideas on appropriate technology.

3 Future action

It is hoped that participants on returning to their provinces will become co-ordinators and promoters of appropriate technology:
By assisting in the staging of provincial appropriate-technology workshops.
By acting as agents for the transfer of appropriate technology and equipment.
By acting as contacts for the Office of Village Development (and the South Pacific Appropriate Technology Foundation when it is formed).
By giving information and asking for information regarding the appropriate-technology needs of the provinces.

4 Educational qualifications

Basic literacy in English and/or Pidgin and/or Motu.

Let us now listen to some of the voices at the workshop:

'We officials interfere with what people are doing. Everything is planned at the top, but the village people do not know.'

'Government confuses people and upsets their way of living. We are late in telling people what is the meaning of development.'

'The government officers are there. I could liaise with them, but it takes time.'

And may we all hold our hands over Anna Nombri, who came out with it like a blow torch:

'I thought I had to work underneath the man, but I am not. I get no cooperation from the administration. I hate especially adult education

officers. The officers come, but they think highland people are dangerous so they stay only five minutes. They tell me: "You are never in your office", but I say, "My office is wherever I am." How can we work as a team?'

Jim Tyler puts it this way:

'There shouldn't be so much uneasiness about the public service. It's actually one of the greatest resources we have for village development. The problem is to motivate the public-service officers.'

What were the views of the civil servants themselves? They were a majority of the participants at the Vudal workshop and they were primarily adult-education officers or welfare officers. In a report from their participants' meeting they say this:

'All communications from the Office of Village Development should be channelled through Adult Education Officers, Welfare Officers or Fellowship village workers...

'Different levels of officers should be having courses in appropriate technology at different times, because when we have all from village level to Adult Education Officer it is confusing and frustrating. They have their own and different interests.'

With the focus on village development it is difficult to see why the interests should be so different, but let us make a mental note on that point.

One question was raised: would you support a rule that every public servant should go back to the village for a period? But the support for that was scant among the public servants themselves. There have apparently been schemes for people who might have wanted to go back to the village on half salary, but the schemes have never functioned. A voice of protest put it this way: 'Why should people going back to the village be paid half as much, why not double as much?'

Another was of a different opinion: 'They always create new positions and sit around the round table instead of going to the village.'

Tony Power, who organized the workshop, sums it all up like this:

'The uneven response of the participants to what amounted to hard work was a bone of contention for both staff and students. In effect it showed, not unexpectedly, that public servants don't take too readily to manual labour. Many claimed immediately that nothing was relevant. The village men on the other hand were enthusiastic and complained not about the work but about the lack of enthusiasm of some of their compatriots.'

And he continues:

'This whole situation was very educational for the organizers. Though not entirely unexpected, it highlighted important constraints on the overall strategy for village development espoused by the Office of Village Development.'

This seems to confirm that there will be a leadership problem at the field level if distribution of appropriate technology is tried through the public-service channel. Referring to the public service one of the participants assessed the situation in this sweeping statement: 'We don't need appropriate technology; we need appropriate persons.'

Considering the recent government decision on decentralization and strengthening of provincial government, this experience at Vudal seems to be of some importance.

Village worker Raphael Oraka rounded the discussion off with this betel-juicy remark:

'Let us think about what we villagers can take back to the village and then the public servants can think about what they can take back to the office and get an increment for.'

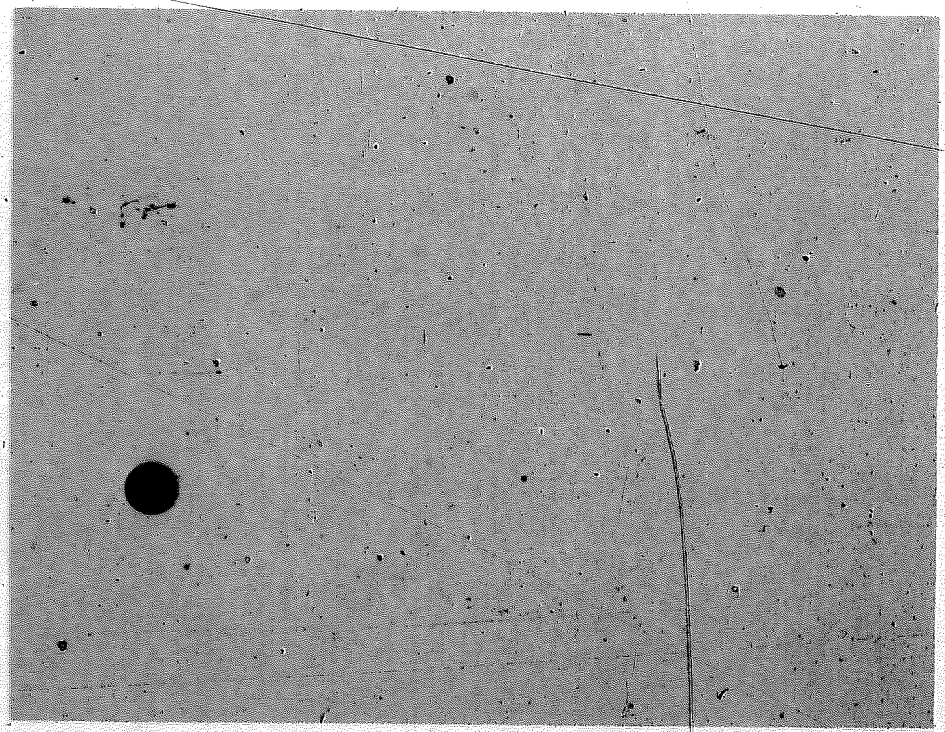
HOW CAN WE GET THINGS DONE?

SHARED INTERESTS AND VESTED INTERESTS: OUTLINE OF A MODEL FOR COMMUNICATION OF ANOTHER DEVELOPMENT

Modern technology, however complex it may be, tends to have a soothing effect on people who interact with it. It is structured and predictable; it is guaranteed, prepackaged and supported, even in Third World countries, by an international service network. We tend to carry this psychological adjustment with us when we deal with the concept of appropriate technology, and perhaps, as a result of that, we do not ask enough fruitful questions. We occupy ourselves more with the design and function of the hydraulic ram water-pump or the brick kiln than with the local resources and the design and function of the social institutions which are needed to make appropriate technology a vehicle of human progress.

It is not unlikely that the problem is not the development of the technology itself as much as it is the development of the organizational and managerial capacity to handle it on the national scale. We have to assume that an intervention will take place. A project or a technology which cannot be duplicated through an organizational process is simply of little interest. Nor is the project of interest if it is on a scale from which no inference can be drawn regarding the mass response. We need a notion of the total context in which we expect a set of appropriate technologies to function. We have to know what we want to do, how we want to do it and where and when we want to do it.

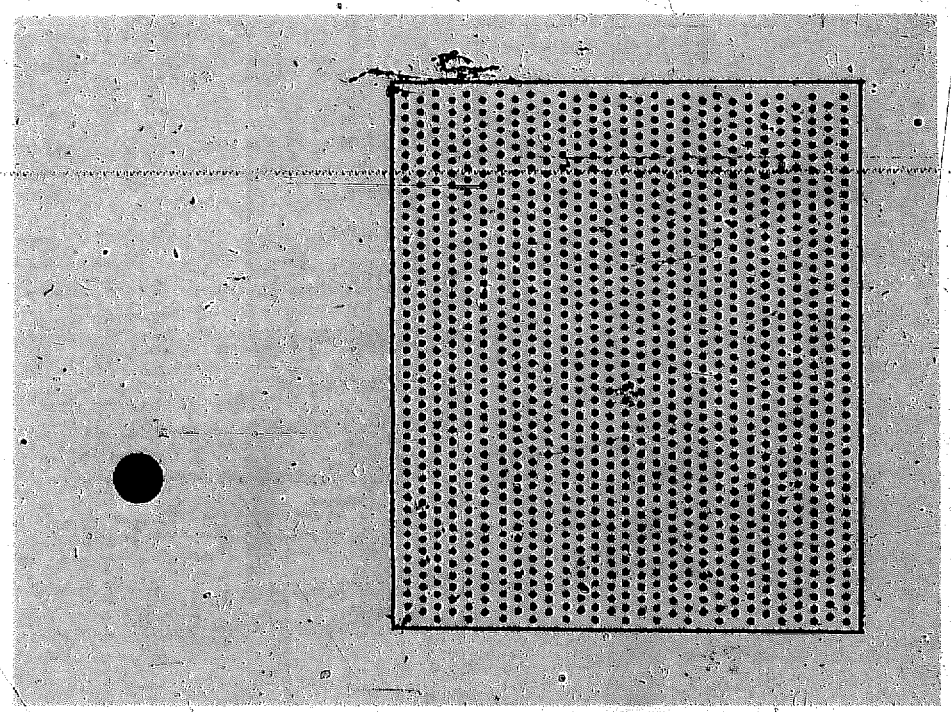
Our understanding of how the mechanics of the social model works may then lead us on to the deeper layers of mass motivation and mobilization on which all development efforts depend.

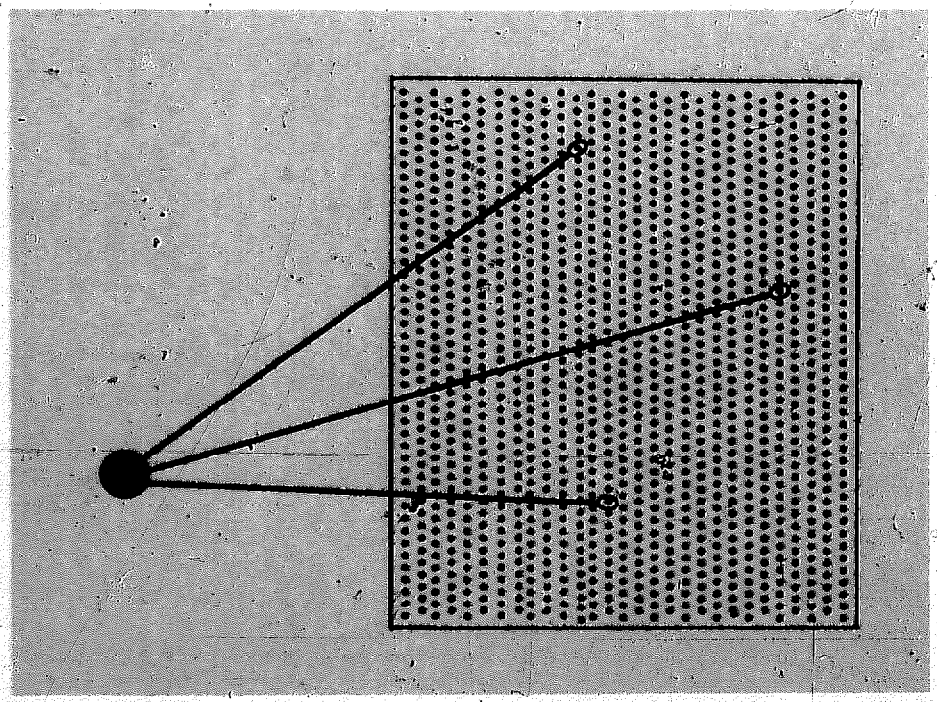


The individual is a communication unit. As such he or she is not very impressive. The average man can store 5,000 words in his brain. A highly educated, exceptionally articulate writer may store ten times as many words.

Five thousand words was enough for the hunting man, but the settled farmer has difficulties in making do with them. And the office worker in the modern city just cannot manage to survive with a limited vocabulary; the big department store in which he shops stocks hundreds of thousands of different articles.

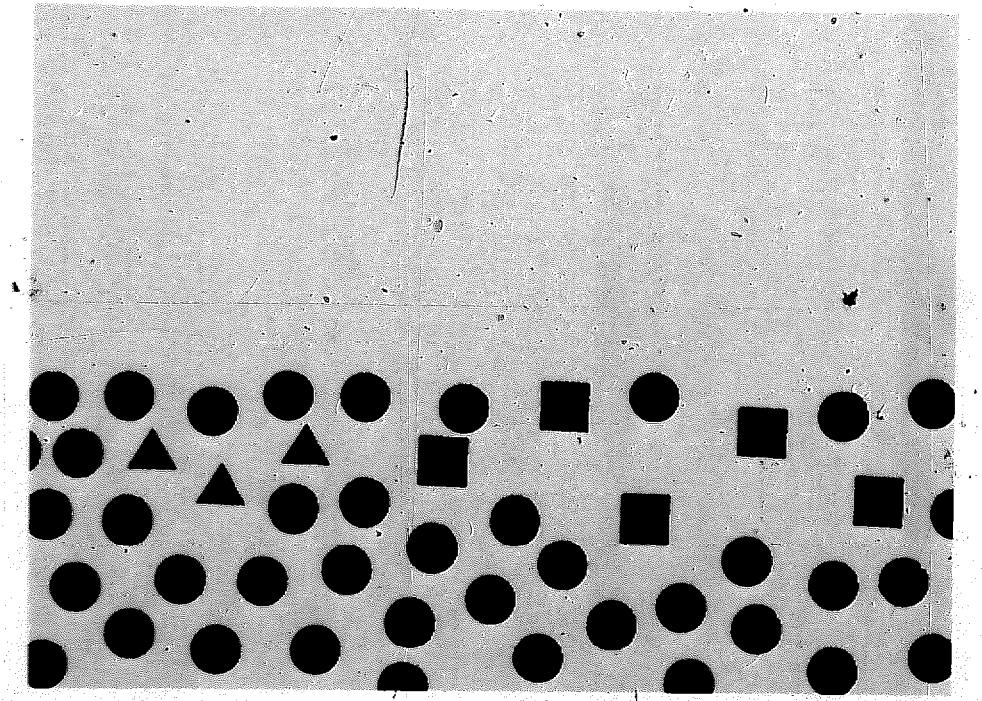
Man's brain is thus ill-equipped for a full perception of the symbolic complexity of his technological, overdifferentiated world. Consequently, man cannot control his environment alone. The individual feels incapable of mapping the course of social and economic development.

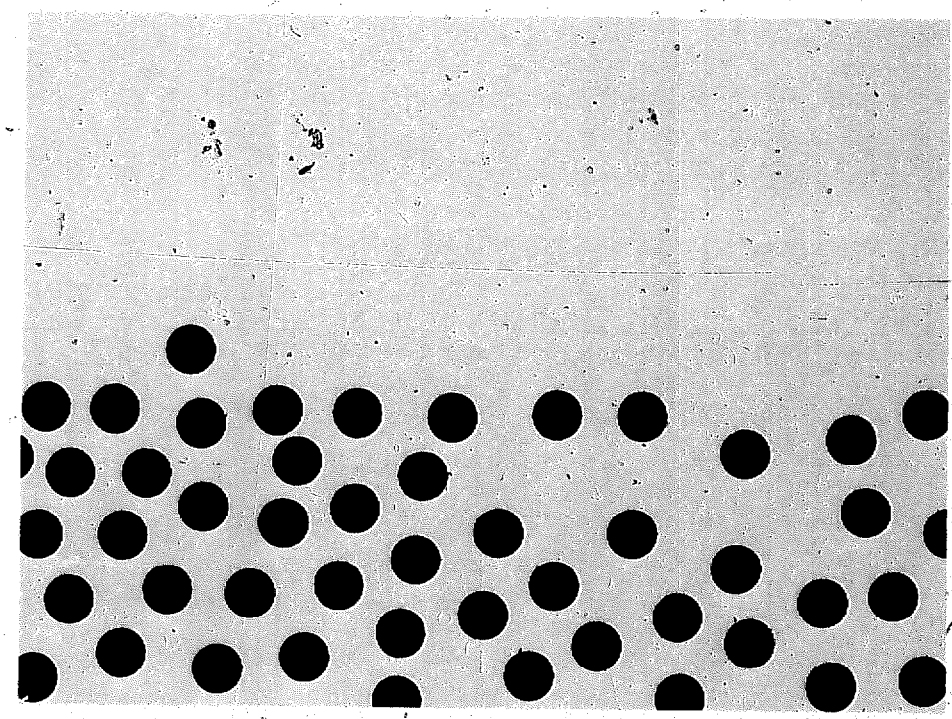




This is the reason, then, why the individual must be modest in his or her ambitions towards an understanding of a totality. Man cannot use gods to solve practical problems. The individual must concentrate on a few topics in order to understand them. The communicative unit specializes in accordance with his or her interests. The individual is a combination of limitations.

The mass may not be readily perceived, but it is a communicative universe. It is more than the sum of limited individuals. The competence of the communicating man is limited to the topics and ideas in which he is interested. The competence of the communicating mass is superior to that of any individual, because, as each individual in it is specialized, the mass of these individuals is magnificently differentiated. Depending on interaction with its environment the mass structures itself in various ways. The metropolitan mass is structured in another way than the mass in, for example, the rural areas in Papua New Guinea. But this does not affect the fact that the mass functions as a communicative universe. It affects only the pattern of the function.

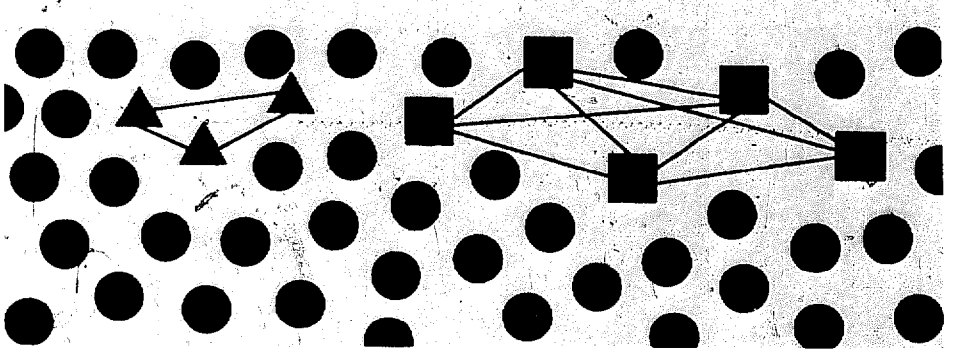


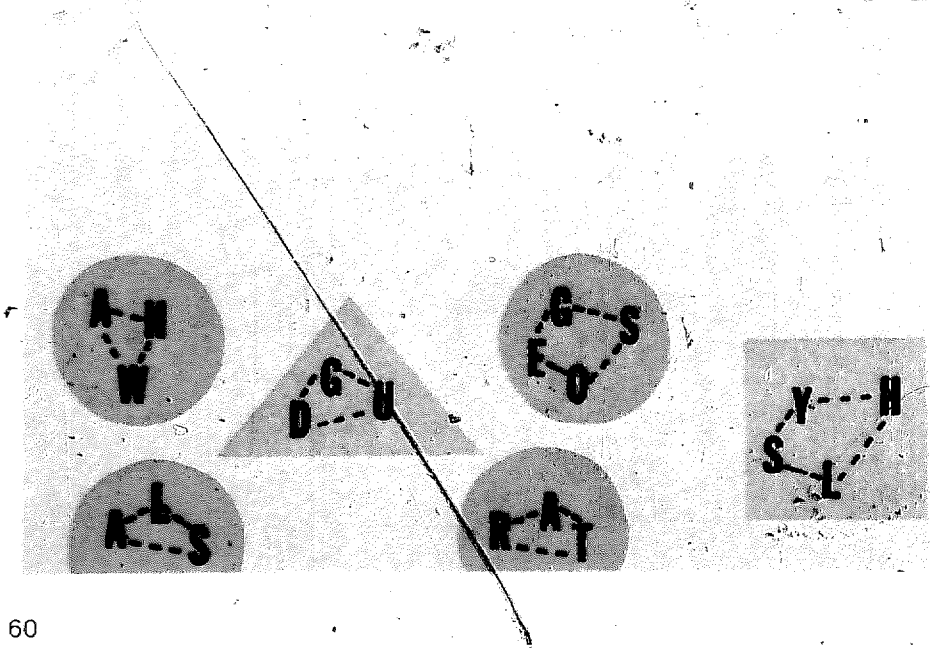


Only in the mass does the individual take shape as individual. The mass is a perfect communication system. It provides spontaneous division of information labour. It covers all fields of importance to our society's life. It adapts continuously to changes.

Because it is composed of individuals who are differentiated in terms of information, the mass can carry and handle an information burden far beyond any individual's perception frame.

The communication flow in the mass is controlled by the interests of the individuals. Topics and ideas of a specific nature activate few people's interests. Topics and ideas of a general nature activate many people's interests. As the saying goes, 'the discussion was of general interest', or 'it was of little general interest'. The flow of information in the mass goes along the path of contacts between topically interested people: 'I am really interested in that hydraulic ram pump. What do *you* think about it?' People in Chimbu Province, Papua New Guinea, and people in Uppsala, Sweden, are probably interested in different things, but the important fact is that they both have topical interests.



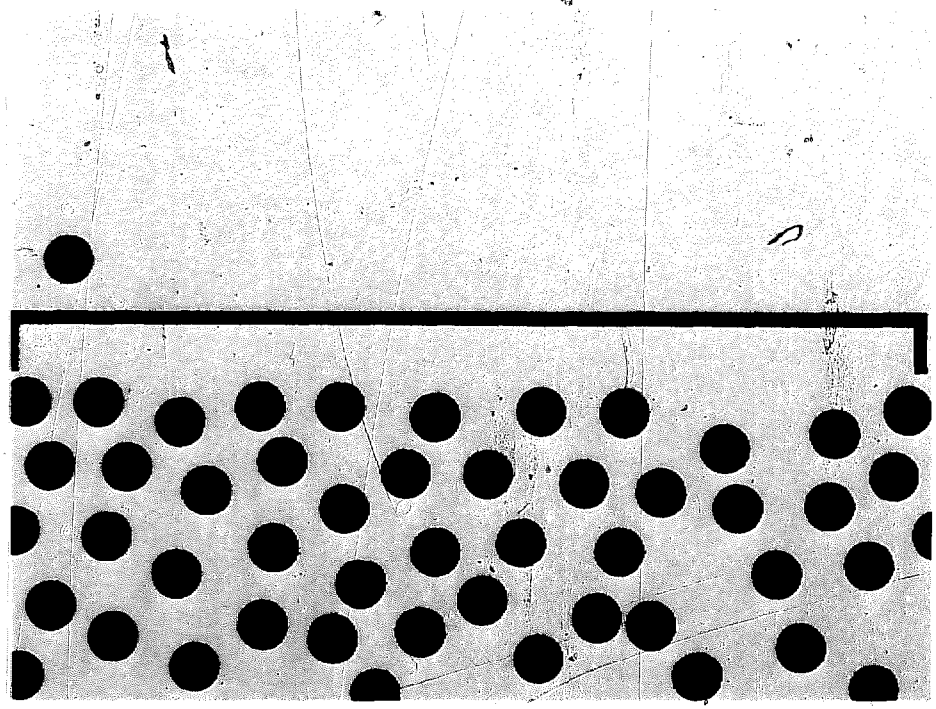


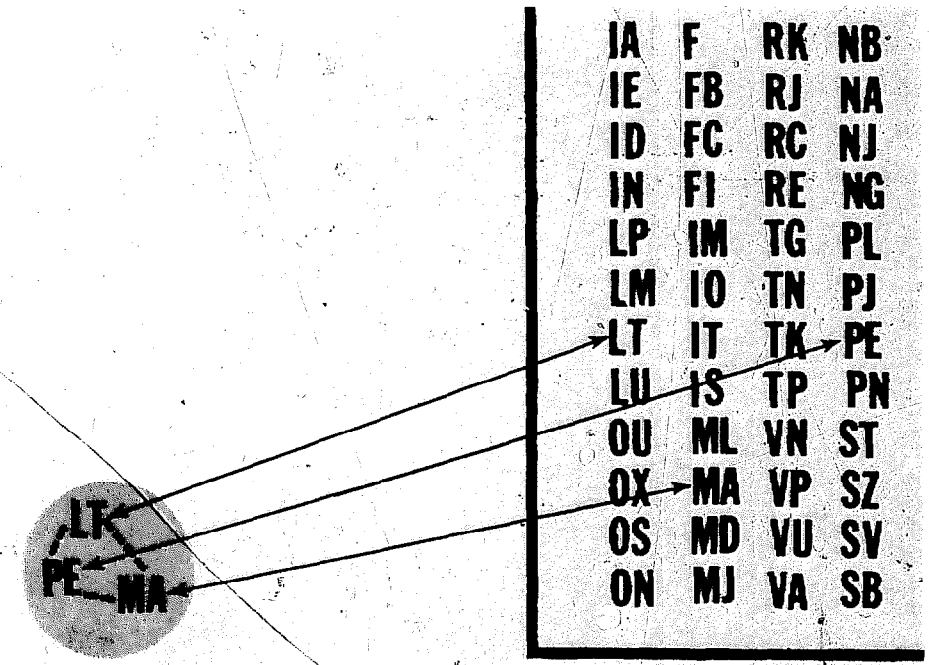
The individuals combine their interests in so many ways that knowledge of their interest in one topical area is insufficient for predicting anything about their interests in other areas. The fact that people are informatively specialized is the fundamental characteristic of society's communicative pattern. But this specialization is very individual. Identical combinations of interests in two individuals probably cannot be found. 'I like carpentry.' 'Oh? I prefer bee-keeping.'

Society is complex. The individual adapts to this complexity by specializing himself as a communicative unit.

'I am interested in three things: car racing, cooking and stamps from Papua New Guinea.'

No authority sets the rules to decide which individuals should specialize in which interests. A random genius superior to any type of rational thinking guarantees a communicative mass, a human society, that functions in spite of the limitations of the human brain. And these days, one can also say, in spite of the symbolic overdifferentiation of the modern environment.



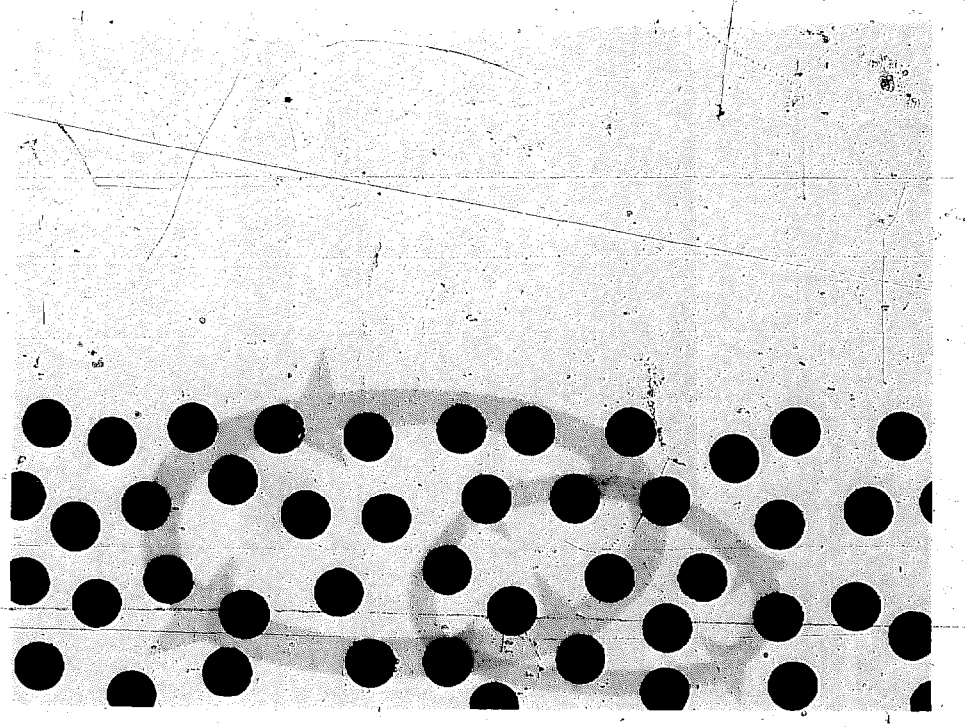


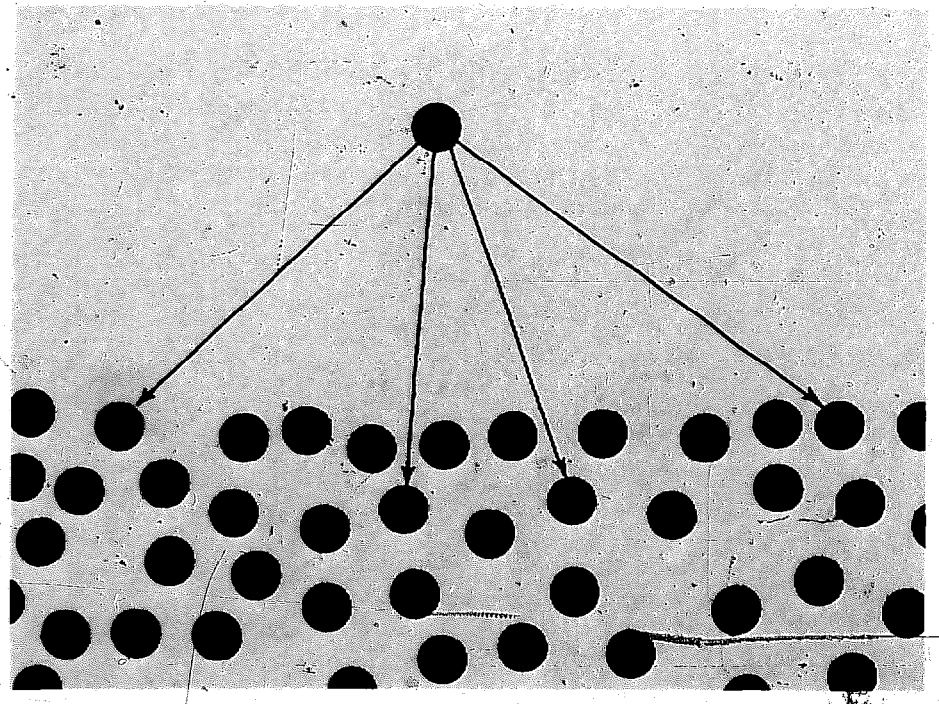
Through the uniqueness of the individual interest combinations every topical area has a contact with all other topical areas. The mass is therefore a chaotic wonder. It has an infinite CREATIVE POTENTIAL. The mass can produce an infinite number of decision alternatives. Information is useless unless it causes decisions. Together, the individual and the mass provide the means for society's decisions. By means of the capacity of the mass and the capacity of the individual in combination, the course of social and economic development can be mapped and controlled. How can the unique combination for Papua New Guinea be formed? What are the combinations for other Third World countries?

The informative energy of the mass is constant. Change occurs through continuous restructuring of the energy. Some individuals find new interests and replace some words in their conversation with new words. Some of the units are all the time released from some of their informative duties and thereby permitted to advance towards new communicative frontiers.

'I was interested in burning charcoal for a while, but could not make it work so I gave it up. Let us rather talk about blacksmithing.'

The direction of change can be controlled by channelling some of the informative energy of the mass into a continuous flow of communication between the mass and the leadership.



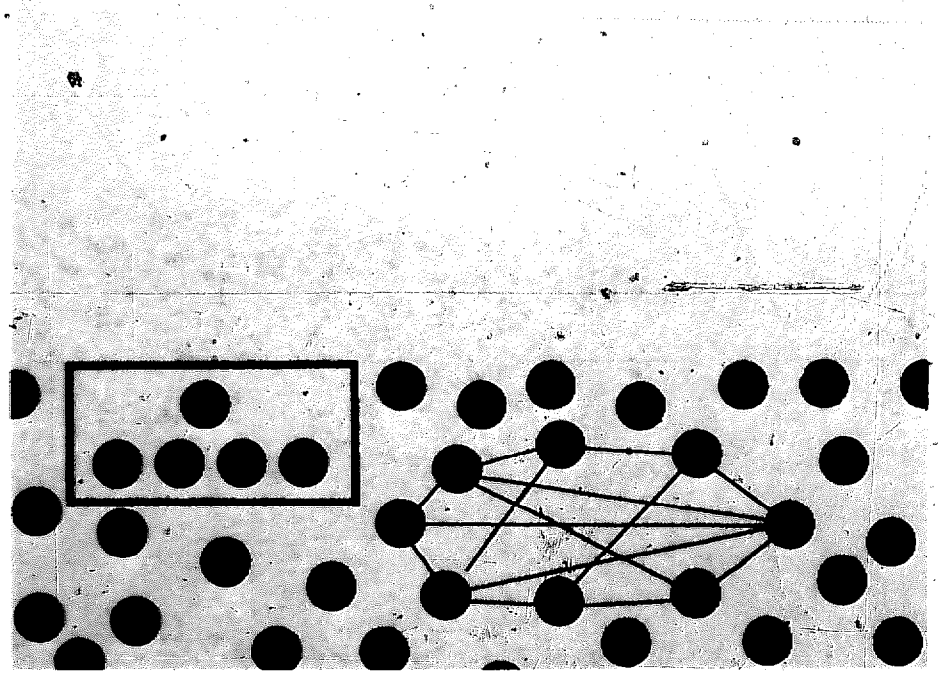


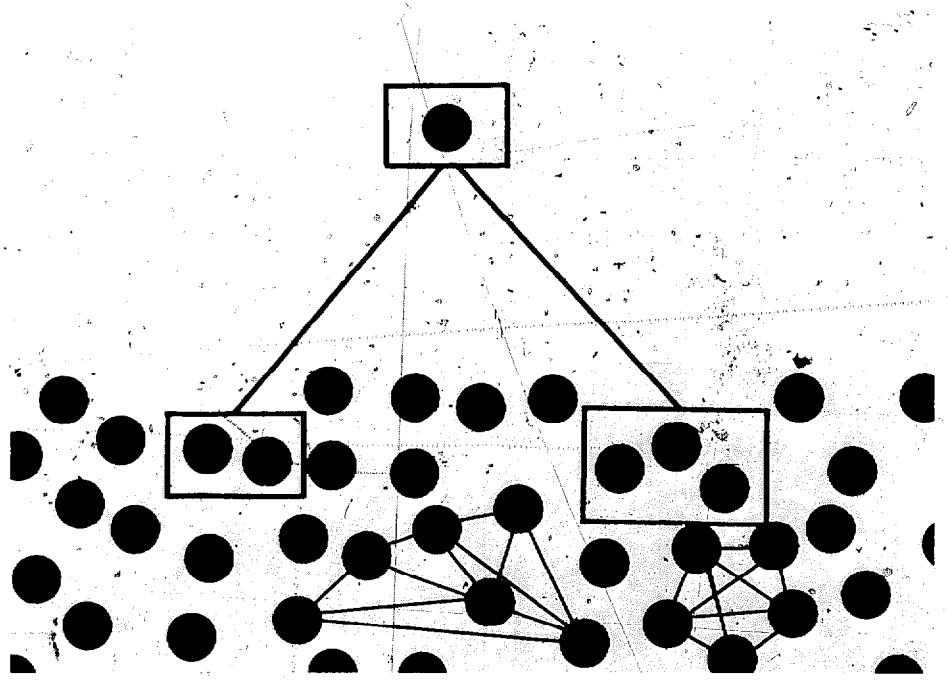
Leadership is a communication problem. Decisions must be based on information from the mass. Otherwise they are non-responsive to social realities. Consequently communication is a political question. Bad political leadership is mostly wrong communication. Modern communication gimmicks cannot solve problems that are essentially political.

How does the decision-making establishment in society function? How is it adjusted to the communicative superiority of the mass?

The decision-making establishment fences itself off from the communicative dynamics of the majority of the mass, which is kept outside the areas of decision-making. The bureaucratic minority is inside. The individuals both inside and outside are communicatively restricted by the combinations of their limitations. The outside majority, however, unfolds itself in social change by continuously restructuring its interests, whereas the inside category is isolated from the dynamics. It becomes an obstacle to social development. The decisions are produced by limited individuals.

'I am sorry there is no money for your project this year. I have already closed the account and written my report to the provincial commissioner.' In Papua New Guinea as elsewhere the development bottleneck is often the administrative capacity in the public service.





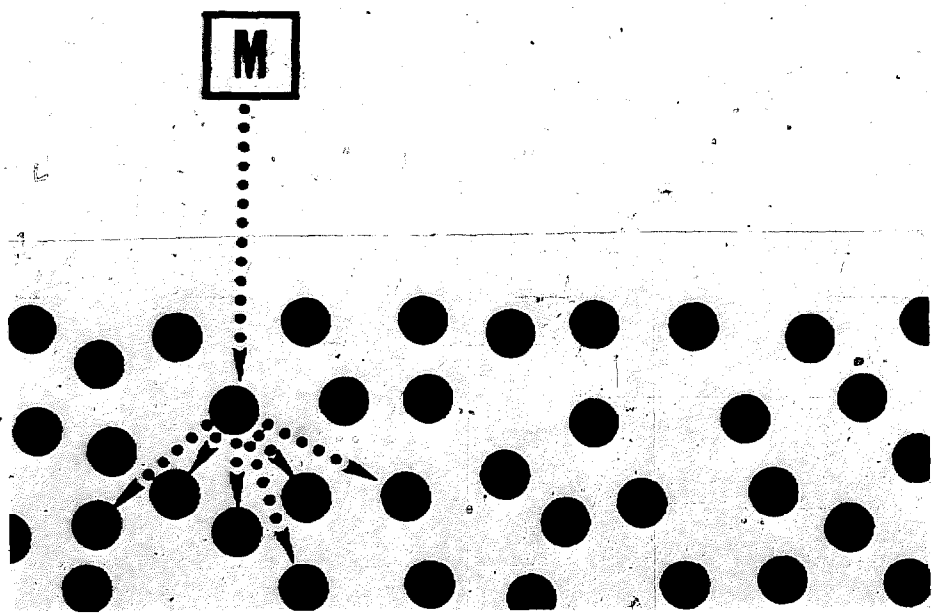
A communicative unit with limited information input produces limited decisions. Those outside, the majority of the mass, create a functioning order without authority. The insiders produce an authority without order. The insiders need power to be respected and thereby they produce a system which is unresponsive to the communicative pattern of the outside society. Possession of power excludes the necessity of responsiveness. Society can improve the quality of its decisions by bringing the creative potential of the mass into the process of the establishment.

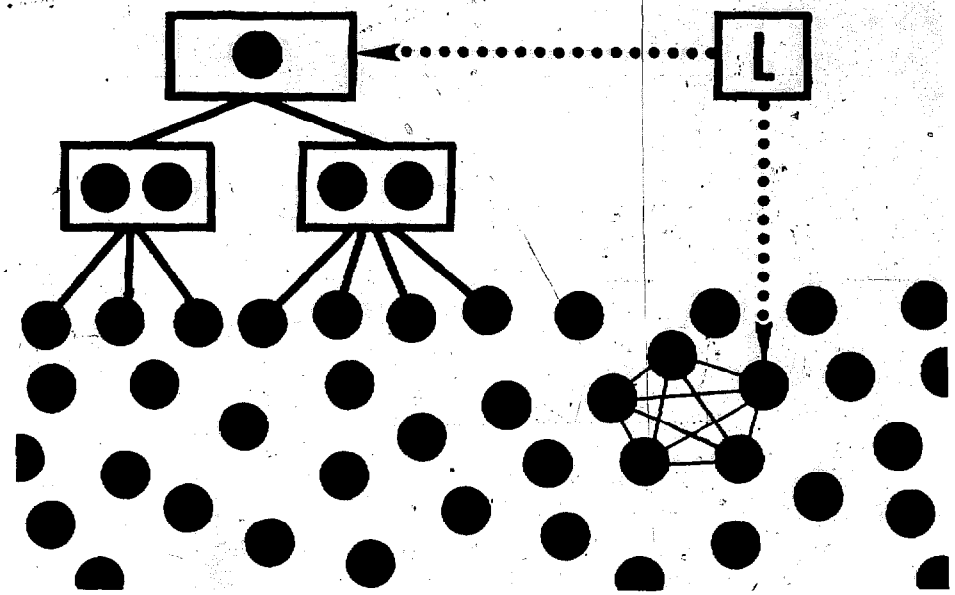
Therefore the problem of leadership becomes twofold: to lead those by whom the mass must be led and to lead the mass itself. The leader must be both part of and beyond both. The leader's dilemma is to lead the mass to fulfilment of its communicative potential by a process of simultaneously eliminating and reinforcing the superstructure of leadership.

The practical problem is to create equality in the communicative pattern of society.

The ideal leader is the individual in the mass whose perceptions of the need for social change are ahead of the mass, but who recognizes that the ideas originate in the mass itself.

Democracy is not a system to be introduced, but an end-product of a communicative process.

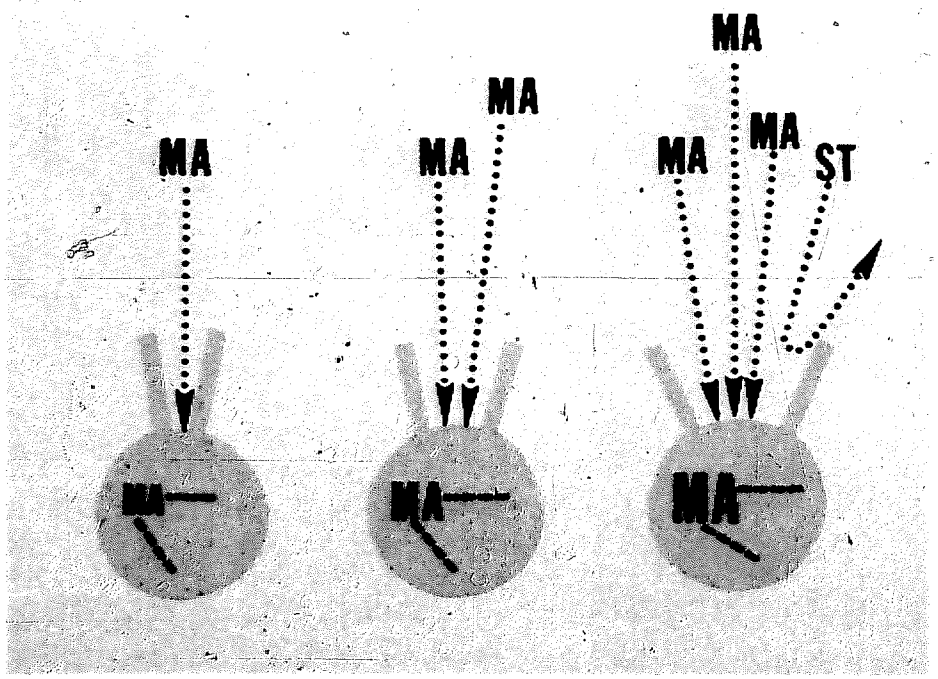


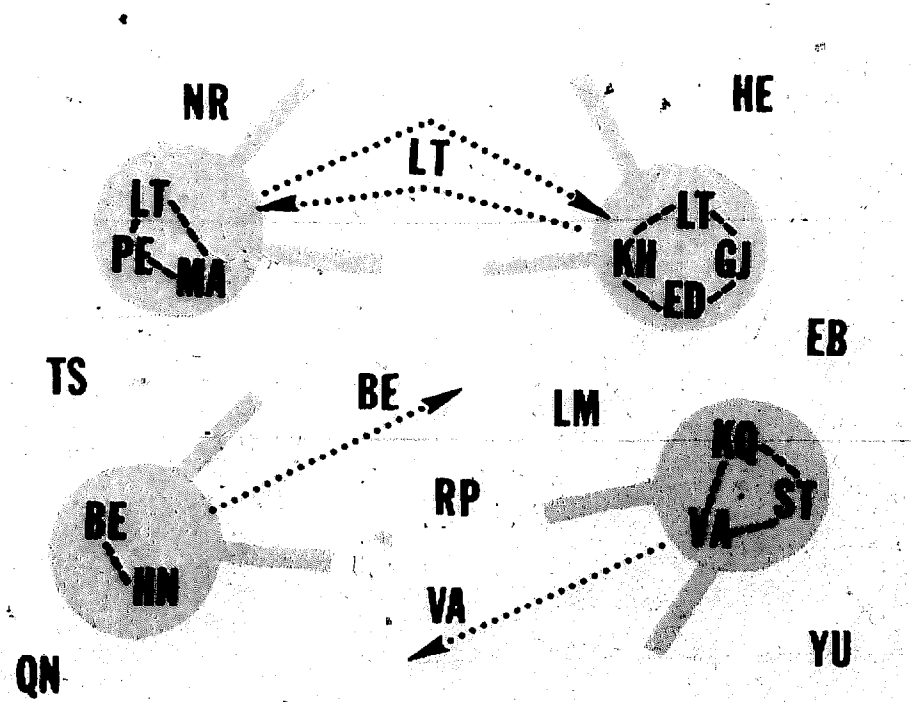


There are VESTED INTERESTS and there are SHARED INTERESTS.

How does the communicative pattern in society function? It has been commonly assumed among communication specialists that an information intervention follows a two-step flow, from mass media through opinion leaders to a number of individuals. This idea offers intriguing opportunities for those who have a manipulative outlook, but it is fortunately not borne out by experience. The opinion-leader theory is probably little more than a superimposition of outmoded authoritarianism on modern sociology.

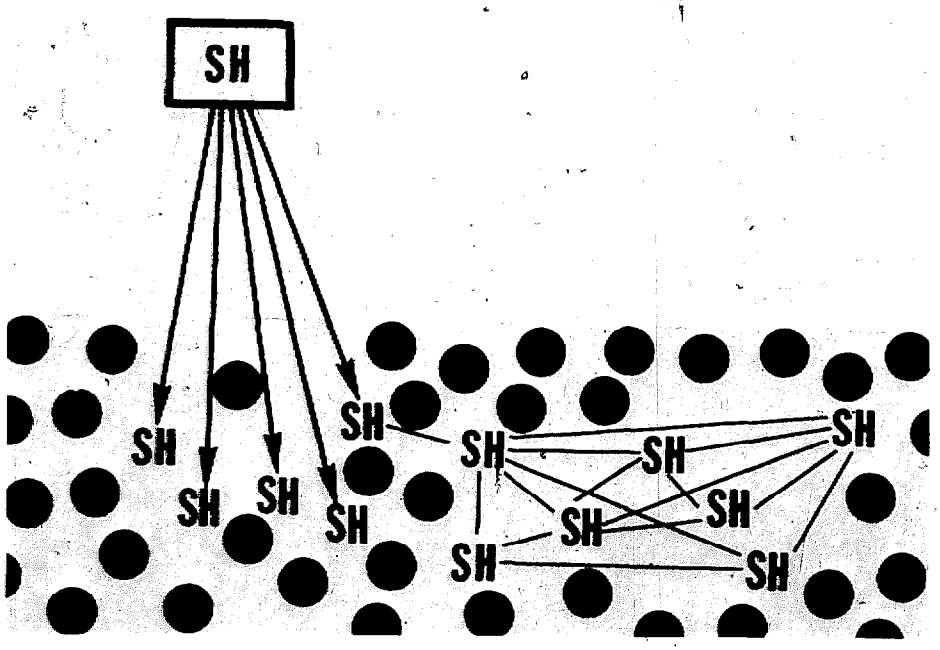
We have said that the communication flow in the mass is controlled by the interests of the individuals. A SHARED INTEREST between two individuals is therefore the channel through which communication flows. The reason is that such an interest provides them with a common focus of perception. It is an old truth for observant party-goers that people communicate best when they have a common interest. Information flows back and forth between people of equal or almost equal interest. And, let us repeat, all interest is topical, i.e. it is a focus of perception on an object or an idea, an opening in the communicative unit through which information energy can flow. This is the reason why the mass spontaneously structures itself in clubs, associations, clans and other interest groups.

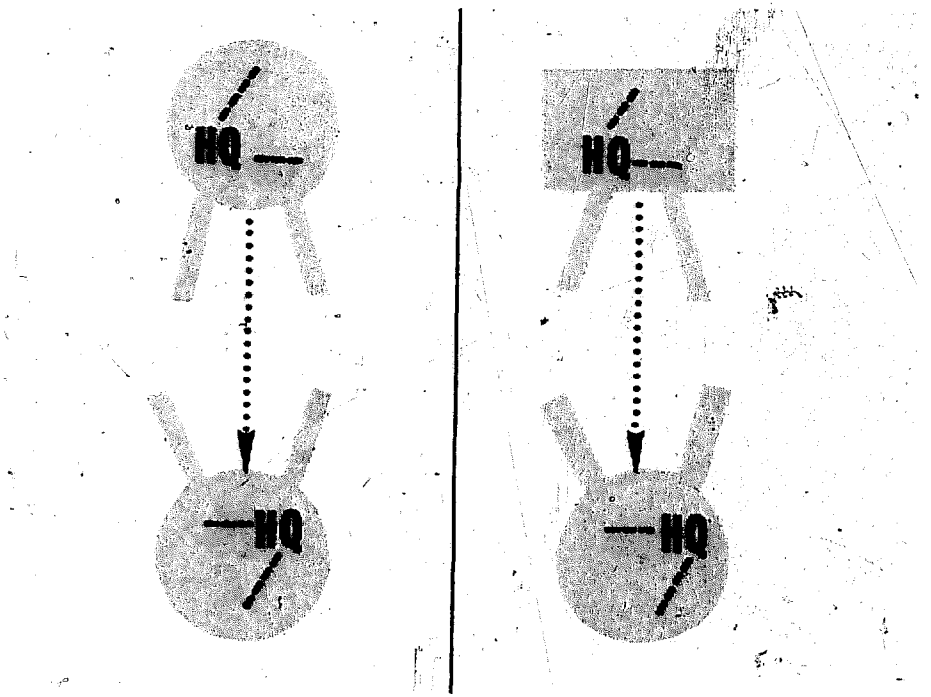




From this follows another important relationship. With increasing topical interest there is increasing exposure for, i.e. willingness to find and receive, topical information—but not for information in general. If an individual is strongly interested in motorcycle racing, he is not likely to be attentive to a message about sheep-breeding, although it cannot be altogether excluded. Communication is a give-and-take business between people. We are, as we say, exchanging opinions. It is a two-way flow. Each individual in the process is giving advice and seeking advice. This advising/seeking activity from the individual also increases with increasing topical interest. It is a common experience that people interested, for example, in cooking like to give and get advice on exactly that.

The communicative pattern in the mass also has other characteristics. When the individual through increasing topical interest also shows increasing exposure to topical information, this exposure is relatively independent of channel. The individual seeks information where it can be found. The source may be a mass medium, just as well as a person. It should be noted, however, that the contention that the exposure is independent of channel does not imply that the quality of the channels is the same. The qualitative aspects of person-to-person communication are infinitely superior.

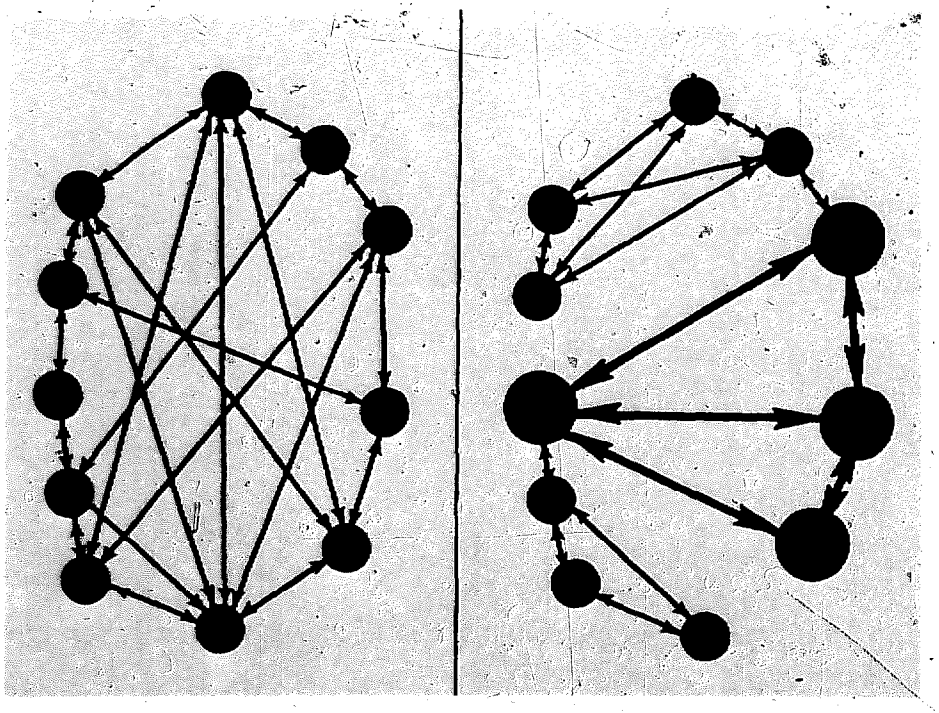


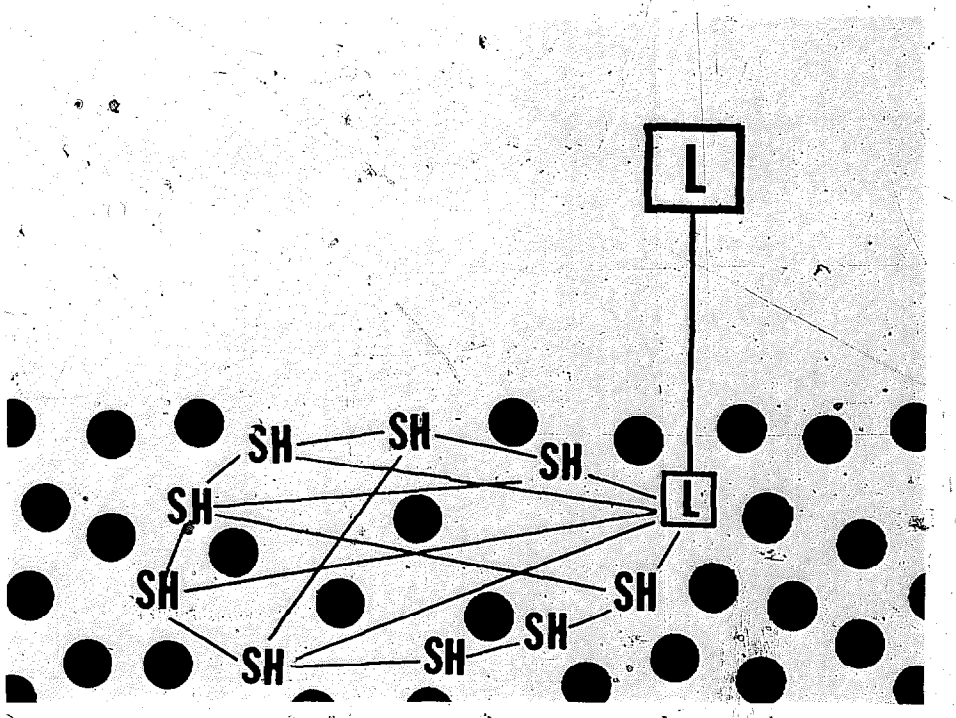


Although it is the quantitative aspects of mass media which make them a working proposition in social communication, through mass media one can reach so many more individuals. Interests control all communication and, as a consequence, mass communication too. Therefore mass communication is topical. It works selectively on topically interested subgroups of the mass. Within these subgroups the flow of information does not go in two steps but in an infinite number of steps and in both directions between interested individuals.

For the success of social and economic development the premise is that the leadership becomes an integral part of the communicative pattern, the network of SHARED INTERESTS of the mass. How this can be done is more often than not a problem of identifying and neutralizing the VESTED INTERESTS which are obstacles to the flow of communication from the mass. It is also the problem of preventing new vested interests from being born in the process. To substitute one upper class for another does not improve the quality of the decision-making.

Another Development cannot be achieved by a hybrid of old social institutions and reformist ideas. The development jargon is so unrefreshed by independent thought. New institutions must be designed which are tailored to the participation of people themselves.



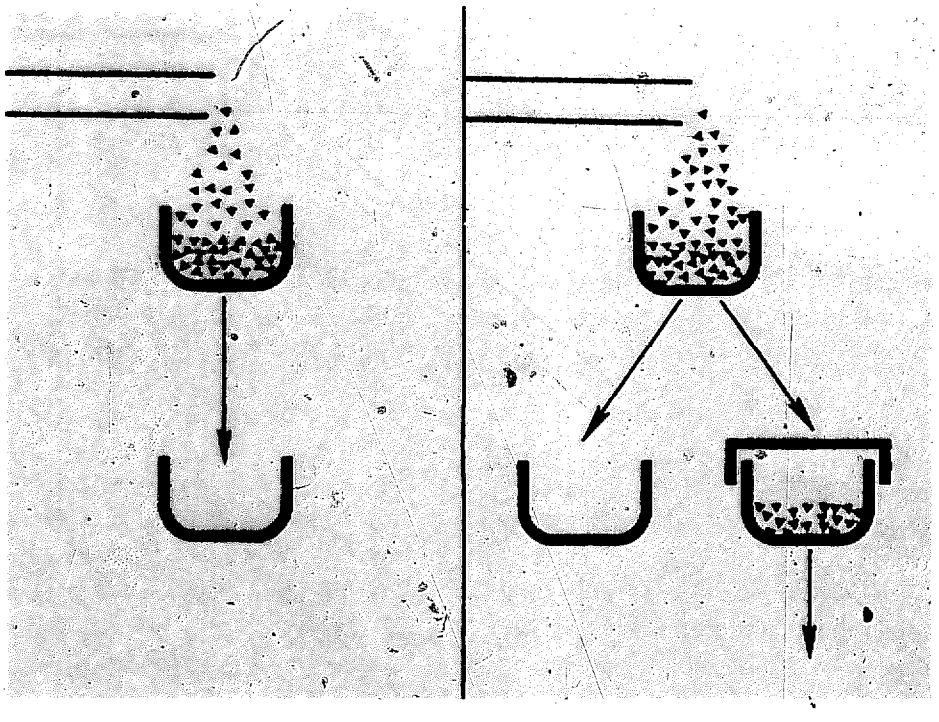


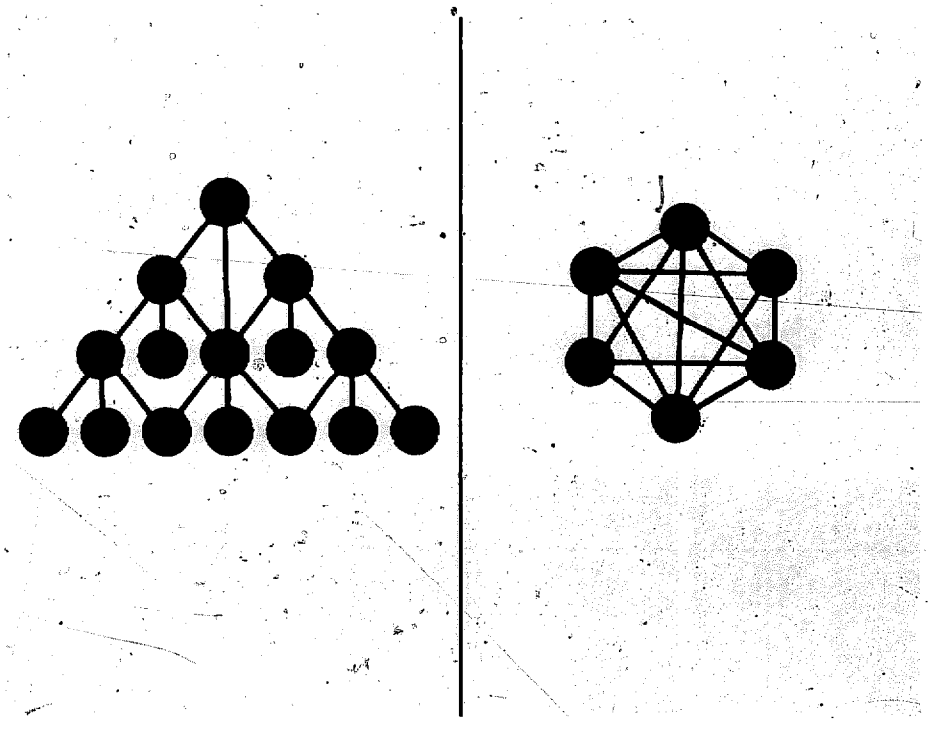
The modern communicative society functions only when people are positively motivated. Vested interests fragment the larger communicative pattern, shatter the cohesion and lead to the formation of subsystems which tend to restructure the free flow of information. Consequently the probability that the creative potential of the mass will 'throw to the surface' ideas and solutions of importance for the whole, i.e. for mankind, is tragically reduced.

There is a perspective of social commitment which runs from sharing of interests to sharing of material resources. There is room for an organizational ethos in that perspective, but hardly for temples.

These are some of the important communicative aspects of the process of social development. In what follows we shall try to analyse this process in a wider context.

The social model in which the drive towards development is based on the self-interest of the individual has ruled itself out. Albeit an animal, man is a creative animal. The purpose of development must be the development of man, i.e. of all men and women, the realization of the creative potential of everyone. This realization is both a process of liberation from regressive social relationships and cultural taboos and a process of creation of a collective spirit. Man is a group animal. The creative potential of the mass can best be realized in the social dynamics of the group. In operational terms the aim of development is to build a new normative system in society, based on such values as self-reliance, willingness to undertake self-criticism, creativity and innovativeness, improvement of knowledge and restraint of consumption.



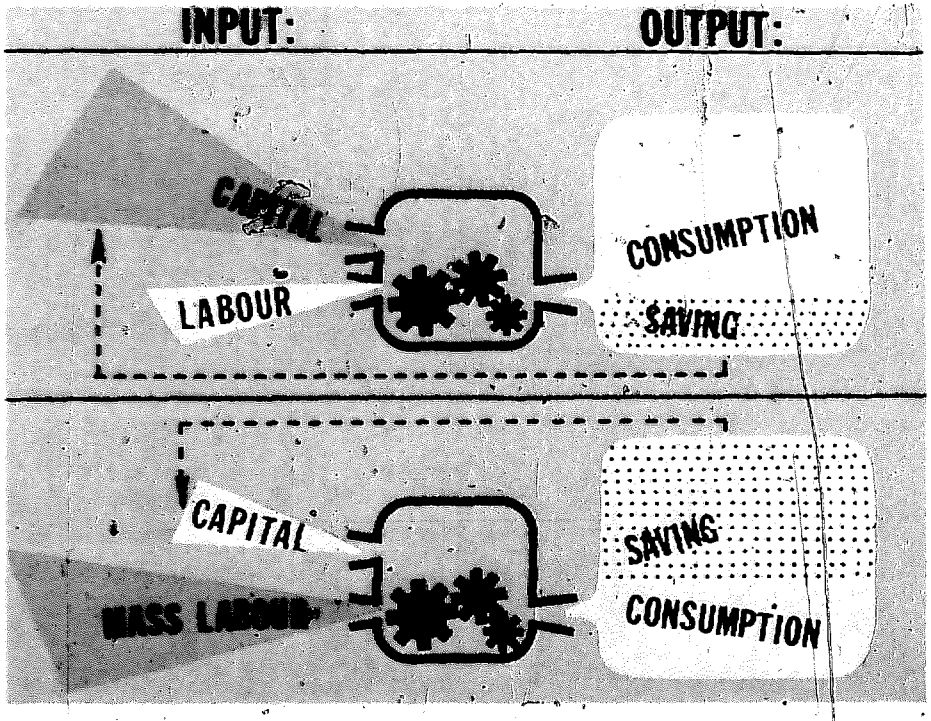


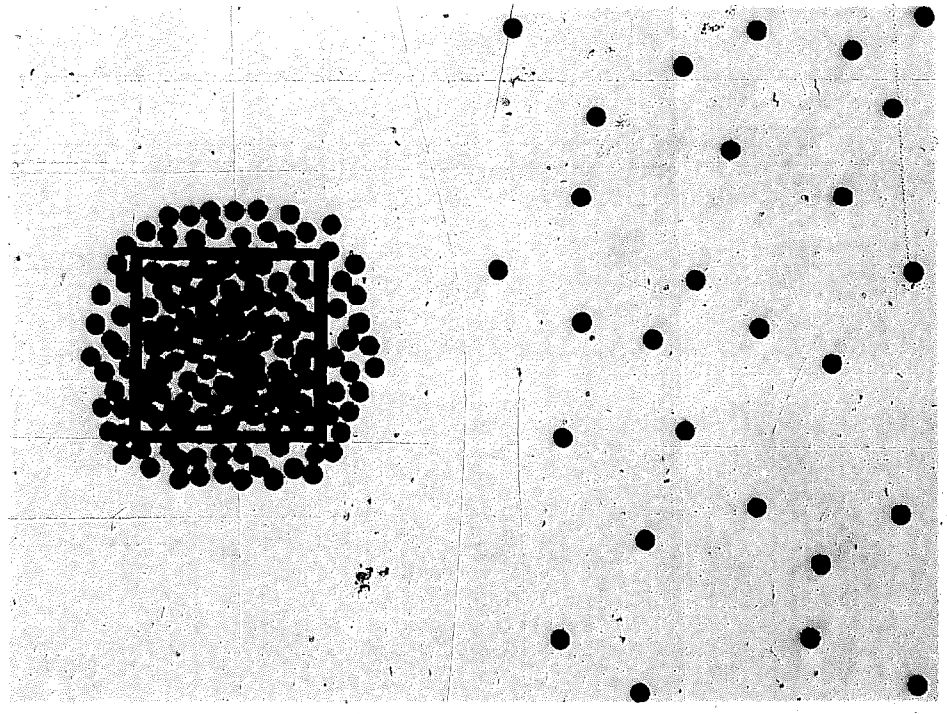
The notion of participatory democracy is not operational without such values and the social dynamic is frozen in structures which permit exploitation and oppression. Models which allow the formation of vested interests are unsuitable.

Development is fundamentally a question of accumulation, i.e. saving. A society at subsistence level consumes everything it produces and therefore has no resources left for investment in future development. Accumulation can be attained through the input of foreign aid or investment and capital-intensive technologies, but such models are in the long run counterproductive. They permit the formation of vested interests and do not allow for equitable income distribution at the national level, and at the international level they merely reinforce the existing global exploitative relationships.

The conventional economic-growth and distribution models, based in both original and reformed versions on strong central control and input of capital-intensive technologies, are primarily responsible for the present situation in which the obstruction of social development by vested interests is already institutionalized.

Accelerating migration to the urban centres, depletion of the labour force in the rural areas, the promotion of a techno-bureaucratic élite enjoying high consumption of foreign goods and a virtual monopoly of social services, explosive expansion in squatter areas for the urban lower class, soaring child-mortality rates, traumatic suffering and apathy in the masses—all are familiar symptoms of the sickness of Third World societies. Frantic urban development efforts take us nowhere. In this situation the key to overall social development is in the rural areas.

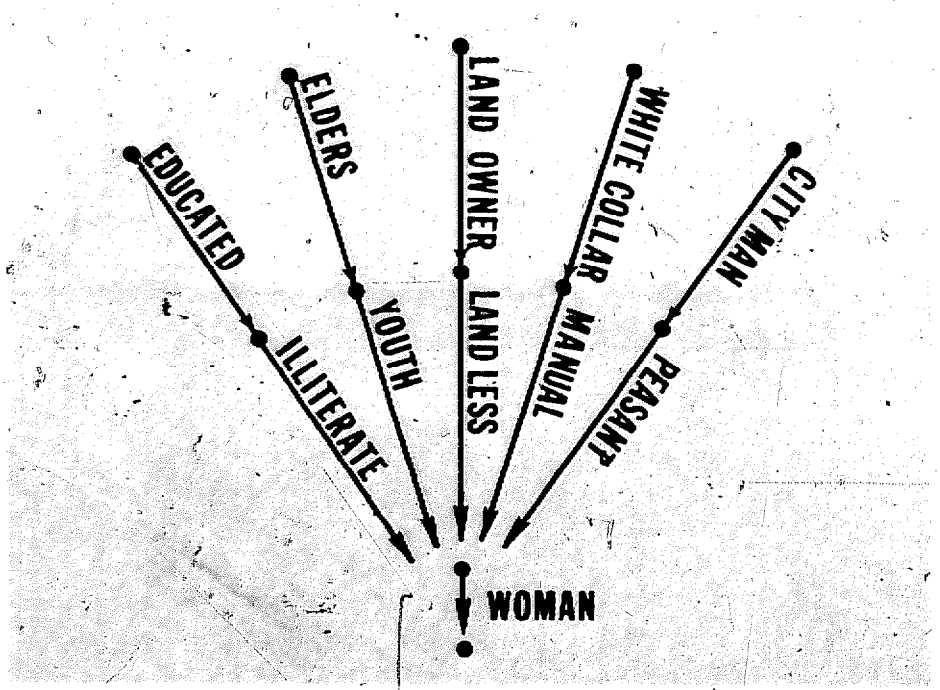




If it fails to function on the basis of capital-intensive inputs—and there are constraints to the increase of such inputs—the economic model can only be made to work through a labour-intensive effort. This is what is meant by the expression, 'Another Development'. Empirically then the other method of accumulation available is the mobilization of the masses. This method has demonstrated its viability in a number of countries where the resource/man ratio is optimal for the purpose. Massive mobilization of human resources and utilization of surplus labour can achieve superior rates of accumulation, particularly if they are also linked to greater restraint in consumption. However, the management of such an input is dependent on a refined and efficiently functioning social-communication system.

Another Development is an approach to development that is totally man-centred. The objective of development is man and the means by which the objective can be achieved are the qualities of man functioning in the mass and in the environment. The essentially communicative nature of this approach is evident. Once the principle of Another Development is adopted, the problem becomes one of acquiring better operational understanding of the concepts from the point of view of the particular national situation.

Mass labour depends on a method for inducing group structuring and mass democracy and for creating and maintaining suitable institutional and managerial functions. Appropriate technology is linked to methods for the stimulation of innovativeness in the work situation. The concept of self-reliance unites these elements and is in itself an approach to maximal utilization of national human and material resources.

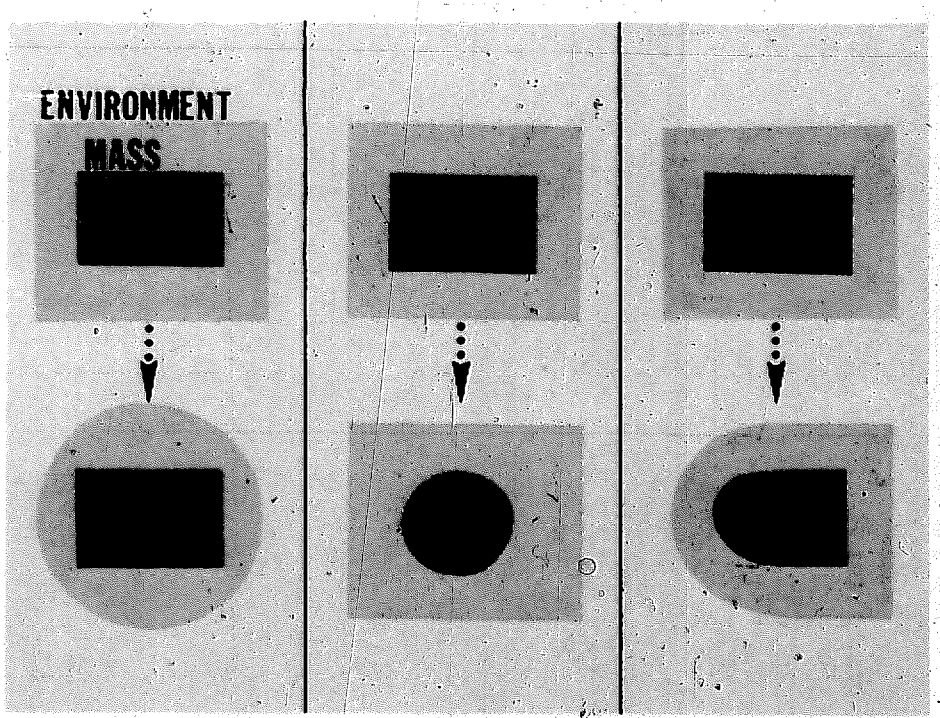


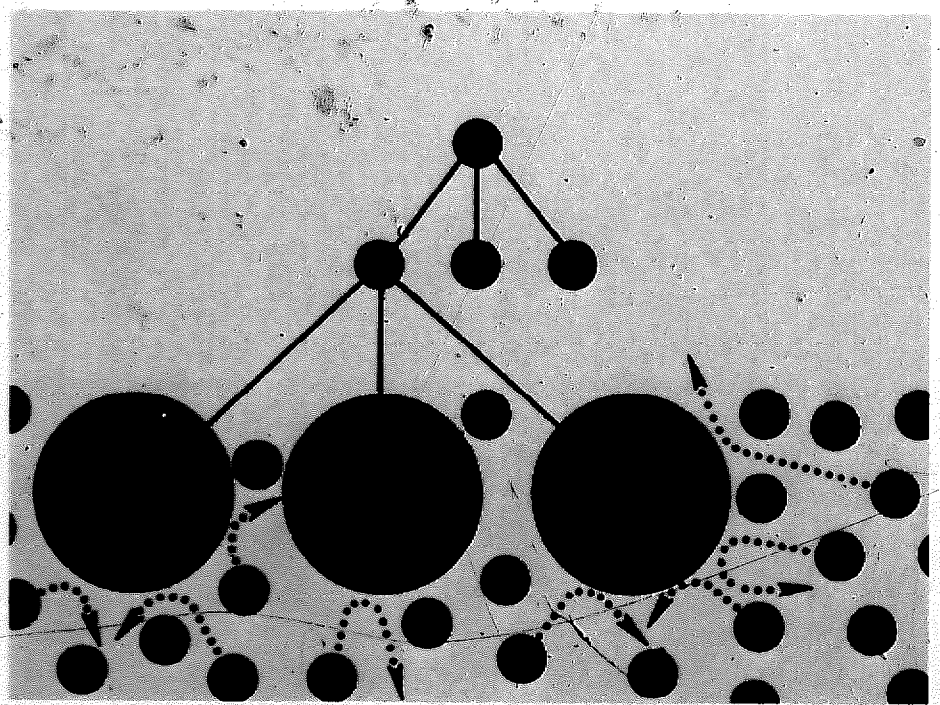
The next step is to identify the various structural characteristics of society in which the vested interests manifest themselves. They represent a multidimensional set of relationships for the oppression of the mass, the mass being defined as those who have no power derived from possession of resources or from social and cultural prerogatives. As has been implied earlier, the city dweller and the urban worker oppress the villager and the peasant, the landowner the landless, the educated the manual labourer, and the adults the young, and they all oppress the woman and indeed, as a consequence of this, she oppresses herself! What are the characteristics of oppression in Papua New Guinea?

This mechanism of oppression is shrouded in cultural taboos and traditions. Development of mass consciousness depends on its demystification. The first task of the leadership is to expose the mass to collective experiences through which it can recognize the social reality and its own creative potential and power to change that reality.

What is important in social change is not so much the structural outcome of change as the process of changing. People must themselves collectively examine the problem, discuss a solution and implement the change. In this process of evolving mass democracy, there are three different situations for the leadership to identify.

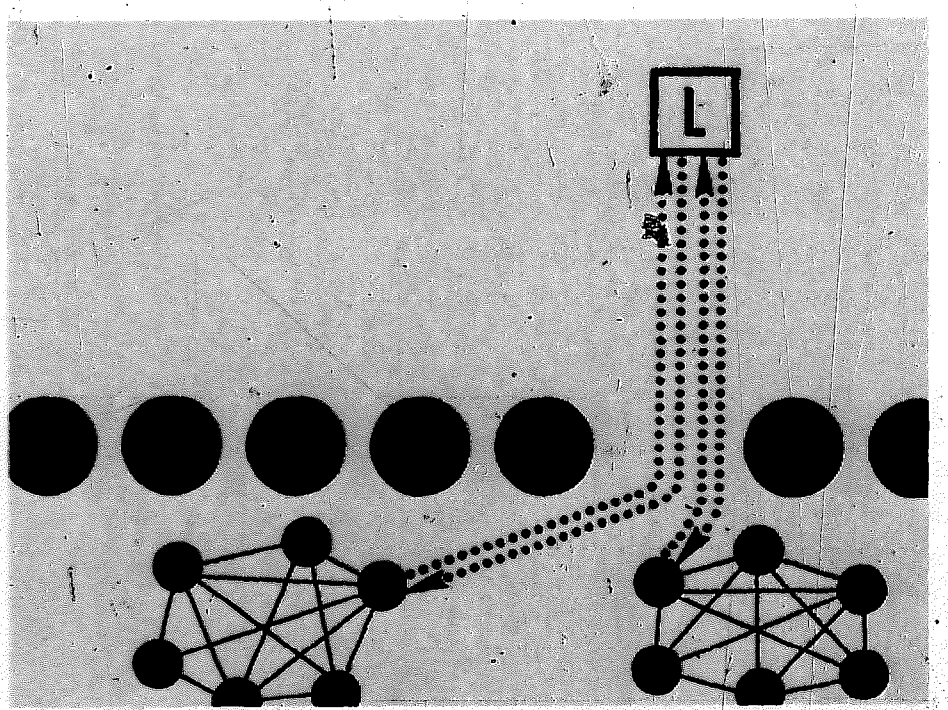
If development of mass consciousness is ahead of changes in the social environment, a situation of frustration and potential violence exists because the expectations cannot be met. The early introduction of uncontrolled mass media can create this situation. If changes made in the social environment are ahead of the mass consciousness, the situation is one of a communication gap. The leadership's problem is to maintain in balanced motion the interaction between increases in consciousness and action initiatives.

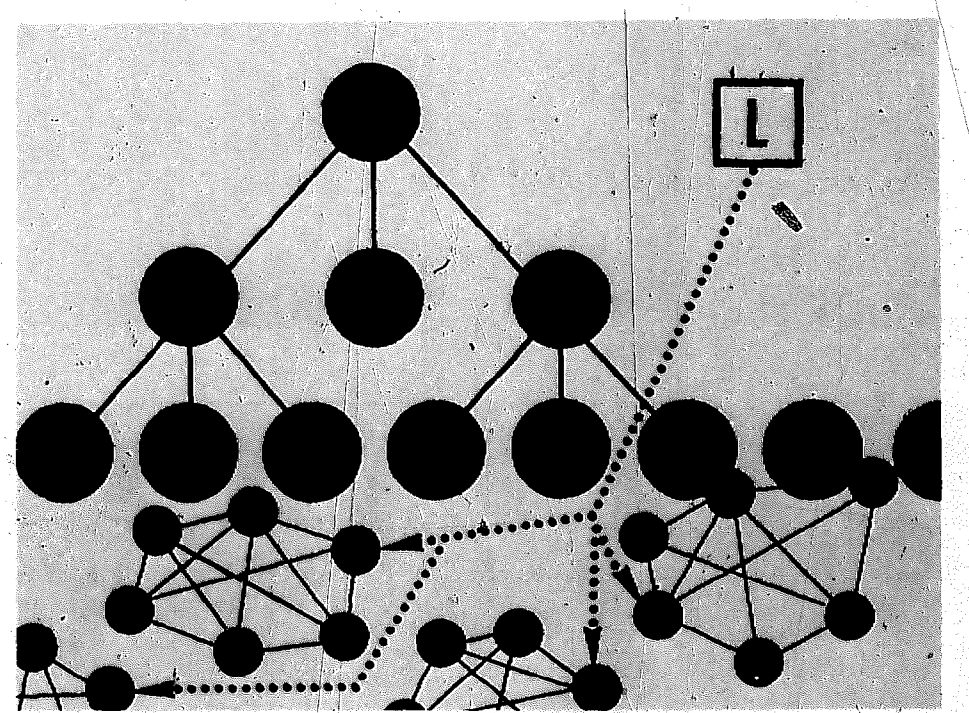




Leadership cannot be exercised without social institutions. One of the inherent conflicts in social development is the infiltration of vested interests in the process of decision-making. At village level in particular, all-out development efforts have invariably merely led to an increase in dominance by the traditional exploiters, either simply because the social status of the latter gives them a flying start in taking advantage of the offers available through government officials or because they are themselves already office-holders who by the nature of that fact feel above the masses and in sovereign control of the resources. There is a total blockage in the flow of information from the mass to the leadership. The arrogance of the bureaucrat is often a devastating experience. Development efforts cannot be run through a public-service system alone.

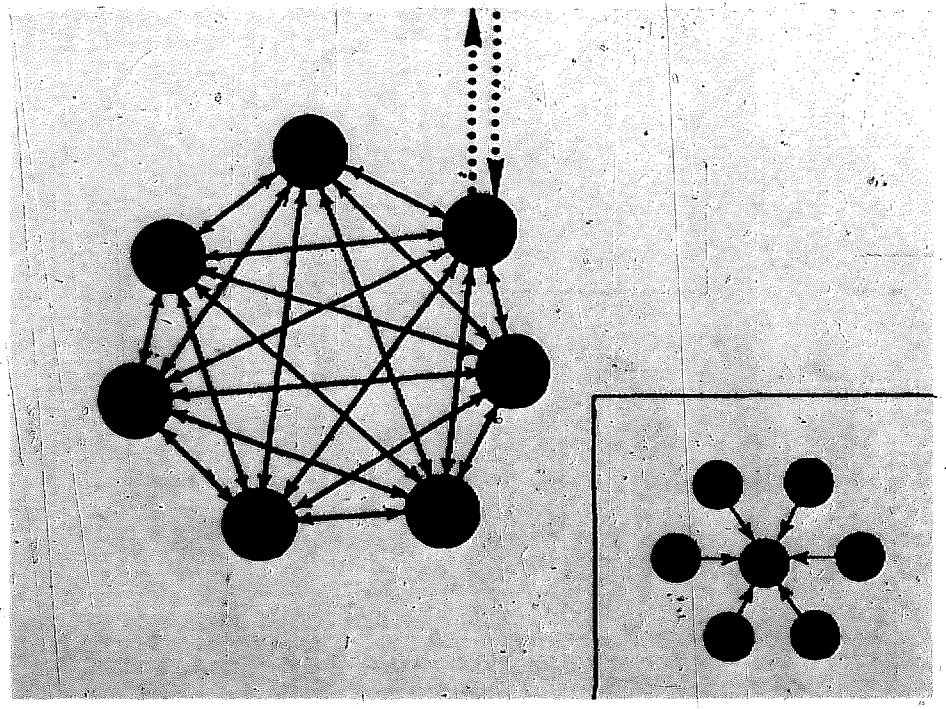
How then can a leadership genuinely represent the mass? How can the creative potential of the mass be released in the thinking of the leadership itself? How can the mass initiative be triggered to break through the apathy of the elitist bureaucratic dominance? How can vested interests be eliminated? The first step is to circumvent the bureaucracy by identifying in the mass members who can function as animators. Lessons from successful development efforts demonstrate that they do exist. Their task is not to be above but to be part of the group, animating its activities, coaching it towards self-recognition and self-realization. These members must be motivated by personal involvement and, indeed, share a value system which combines humility and sensitivity with the commitment to personal example.

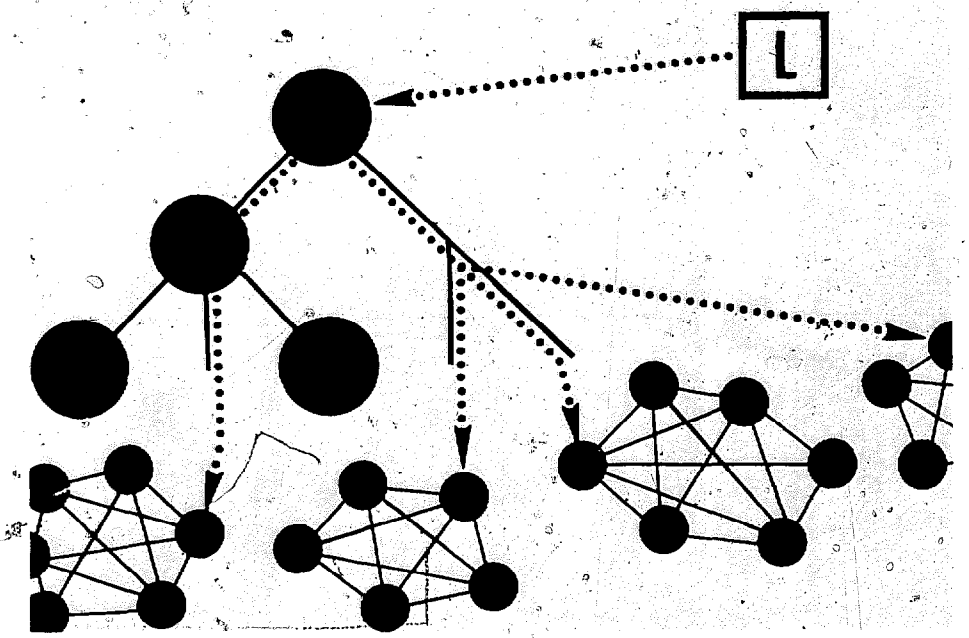




This cadre of animators provides the vital channel of communication between the leadership and the mass. It is their job to convey the needs, the ideas and the motivations of the groups and group-clusters to the leadership—and to carry the policy decisions and advice from the leadership back to the people. Their role is to inspire their fellow men to the massive actions that prove for the people themselves the power of the mass. The psychology of this is the demonstrable and conspicuous effect: taming the course of the flood into electricity and irrigation, crossing the mountains with roads. The selection and preparation of these animators for their task becomes an issue of highest importance for the leadership. In practical terms it is a matter of recruitment and training and political motivation. How can it be done in Papua New Guinea?

The second and sometimes parallel step is to break up the elitist network which is distorting and diverting the flow of communication between the leadership and the people. The bureaucratic, technocratic, academic and capitalist subcultures are producing behavioural-norm systems, and thereby vested interests, which can only be modified through contact with the mass. They nevertheless also represent technical know-how, vocational skills and knowledge, which can be useful to the mass. Their role is to participate in the actions of the mass, learning through self-experience, and to contribute with their knowledge to the development of literacy, appropriate technology and whatever is needed. Mass democracy cannot be realized without their participation.

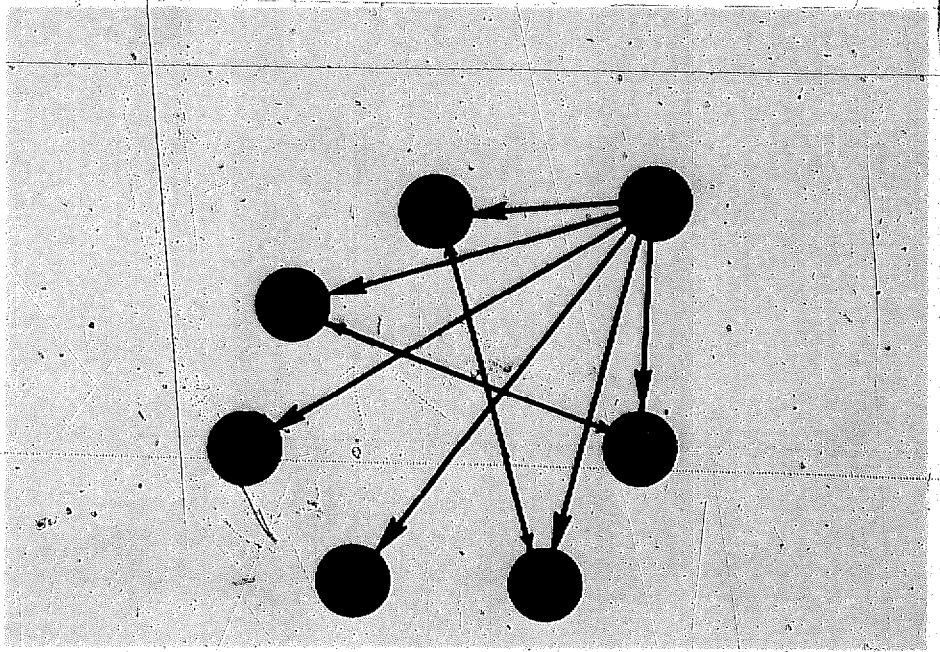


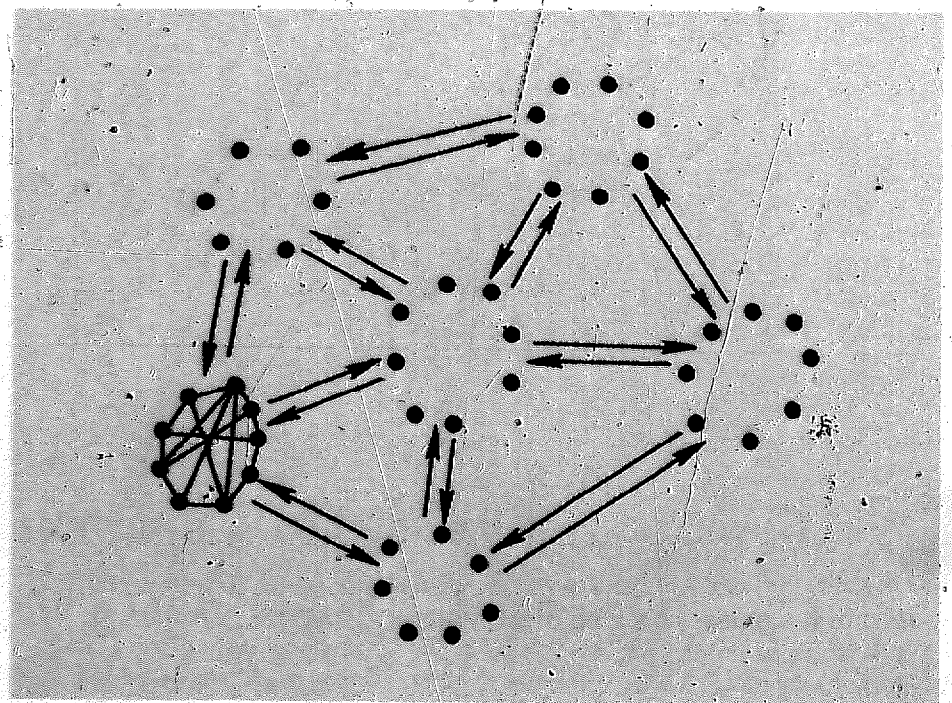


The group, the commune, the cell or whatever name it is given, is focused on creating the collective spirit among its members. The group produces its own norms of behaviour within the bigger frame of references. Self-reliance is the prime mode of the group. There is only one way of doing things and that is the hard way, without any help from outside. Therefore, fostering group spirit means that government must abolish paternalistic projects and financial support. As in group-therapy the purpose of the interaction is to make the group member see himself as exactly that and to make him or her advance from the stage of infantile self-interest to a stage where there is a genuine desire to contribute to the decision-making and work of the group. Occasionally the individual must be made the centre of group attention, expose itself to encouragement or criticism and attempt self-analysis. The group is a furnace for vested interests.

The group is by no means totally resistant to degeneration. Direct or hierarchical dominance relationships with associated vested interests can easily develop. Essentially it happens when the interests of the individual get out of balance with the interests of the collective. This retrogressive phenomenon starts in the process of decision-making when the group introduces values in its normative system which favour the individual at the expense of the group, as in the provision of economic work-incentives or extra land allocation. The totally healthy collective is probably an ideal. If it is imposed, it creates alienation. If it does not provide a structure for identification it is soon dissipated.

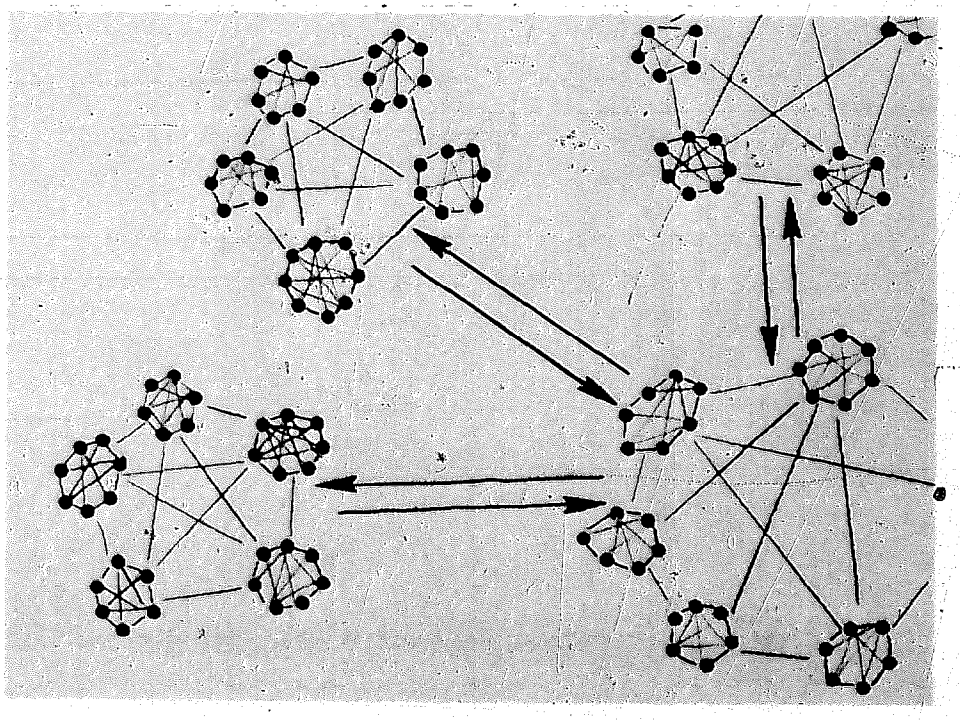
There is no single model. The process of creating group solidarity is a continuing learning experience for each individual. How can an operational control be provided?

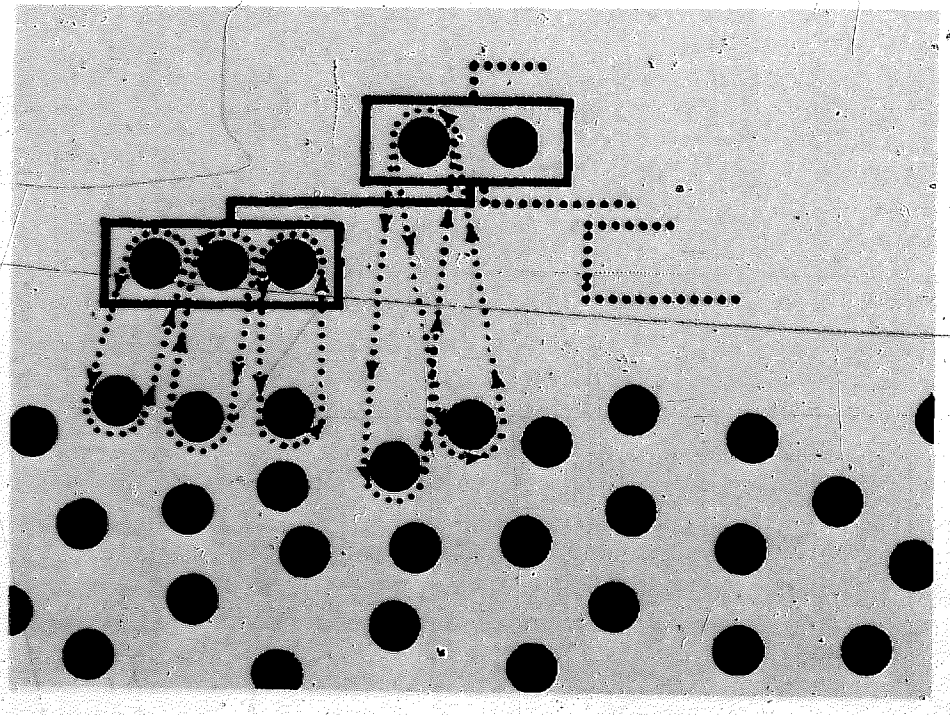




The ideal collective or group cluster is a system of shared interests in which communication flows freely. Since shared interests are the very channels of communication, it is desirable that society should have operational contact with those interests that are the most decisive for its own progress. What I am saying is that this knowledge of the communicative nature of society can be used in structuring society. Mass democracy is the sharing of interests structured in a systematic process. The forums are the group meetings and the mass meetings. At grass-roots level the individual is accountable to the group and the group is accountable to the larger group cluster or collective. The bloodstream is the daily labour in field and factory; the heartbeat is the regular meeting at which it is checked and given new momentum. The meeting reviews all the action taken in the light of what it considers shared interests, and modifies them if necessary.

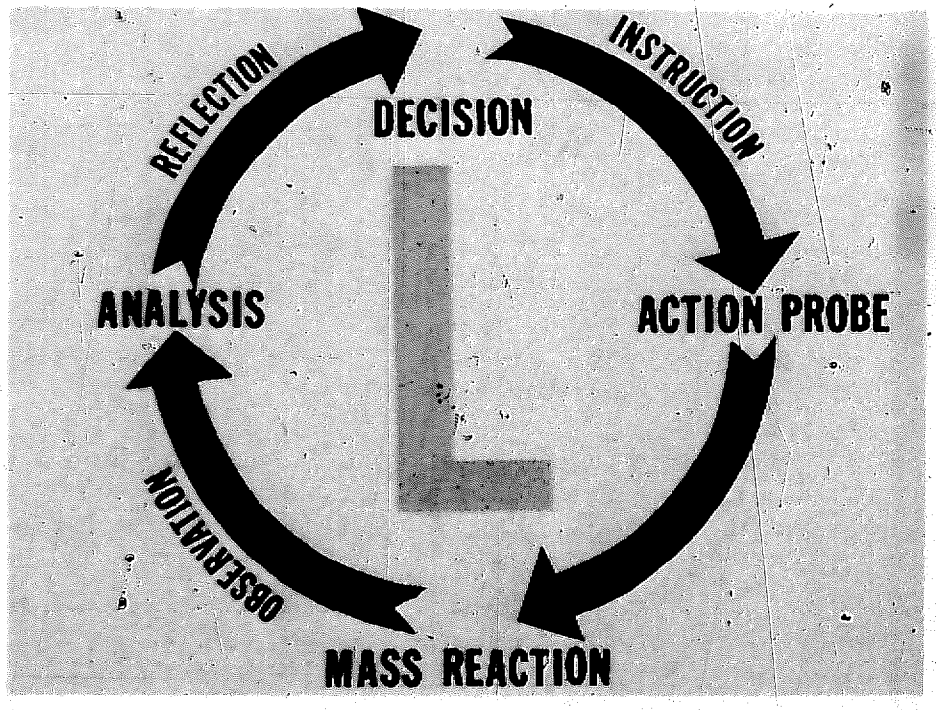
At the local level, mass meetings can be kept cohesive enough to be meaningful. At the province or national level, the process of keeping the channels of shared interests open becomes more complicated. A few hundred people can maintain a relevant discussion. Thousands of people gathered together cannot. The election of representatives becomes necessary and the seeds of the growth of elitism and vested interests are immediately sown. It is the illusion of the western democracies that an elected representative totally shares interests with his electorate. In all its varied manifestations, democratic freedom has so far mostly meant the freedom to have vested interests and the achievement of western democracy has meant a tolerable balance between such interests.

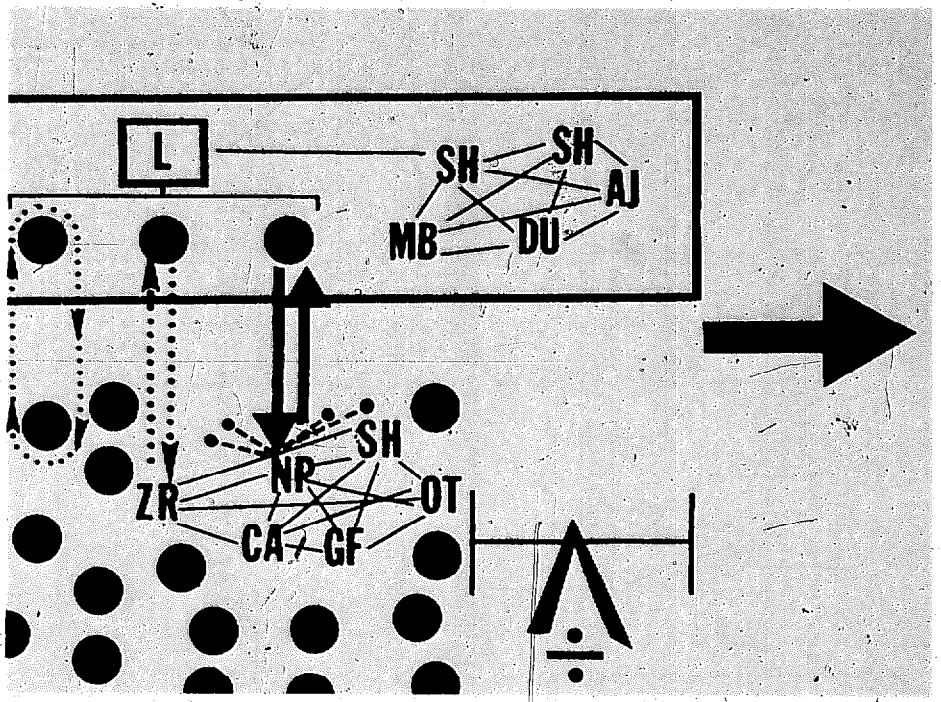




Ultimately democracy cannot exist without inspired leadership, but it must be the kind of leadership that has brought the collective intelligence and the creative potential of the mass into its process of decision. Institutions are necessary because they provide information storage and contact in space and time, but it is imperative to develop the system of government towards what can be called a rapid and permanent HIERARCHICAL CIRCULATION. The individual is a combination of limitations. To replace one governing élite with another cannot, therefore, improve the decision-making. But the potential of the mass is unrestricted. Hence the mass must be brought into the governing institutions. The permanence of rapid hierarchical circulation will balance the limitations of each individual with the communicative superiority of the mass. The ultimate goal is to bring all decisions into line with the wishes of the mass. This type of COMMUNOCRATIC GOVERNMENT can increase substantially the probability that man's potential is fulfilled in society.

The mass needs institutions for storage and retrieval of information. The problem, at a given point in time when a social development effort starts, is that the information combination of the institution in terms of the decision-making process exists *before* the combination of the wishes of the mass. It is not possible to achieve an absolute identity, but achieving a relative or optimal identity between the combinations is essentially a matter of narrowing a time gap. There are three remedies: first, the rapid rotation of individuals; second, the direct-contact link between the leadership and the mass, and the cadres of field animators—both of which have been stressed before—and third, a policy of continuous intervention or action probing. This approach is well known in modern mass-communication theory and practice. Sometimes it is called a 'test run'.



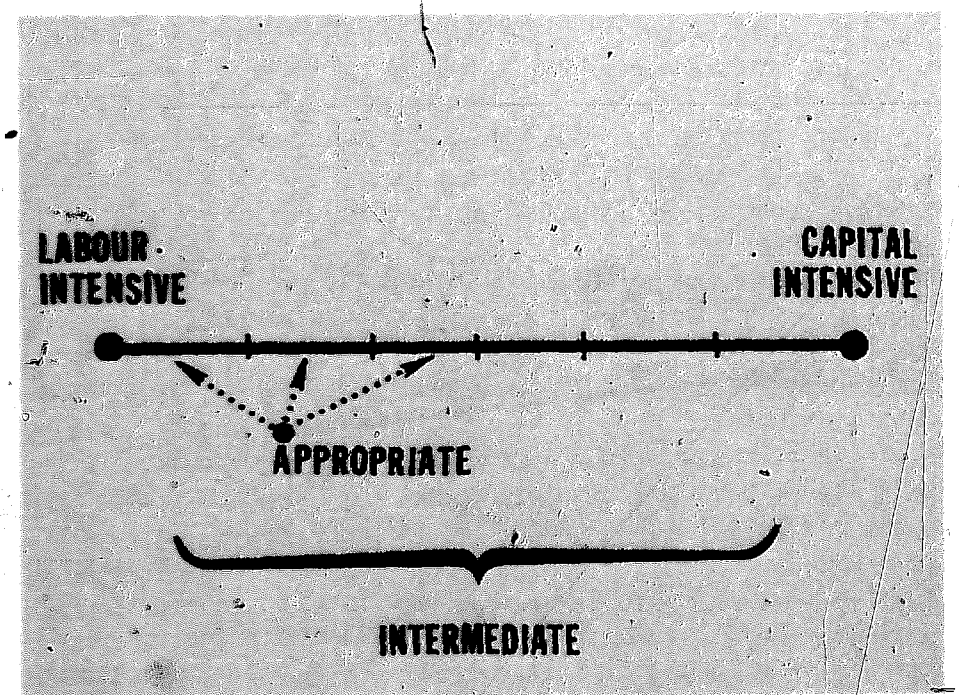


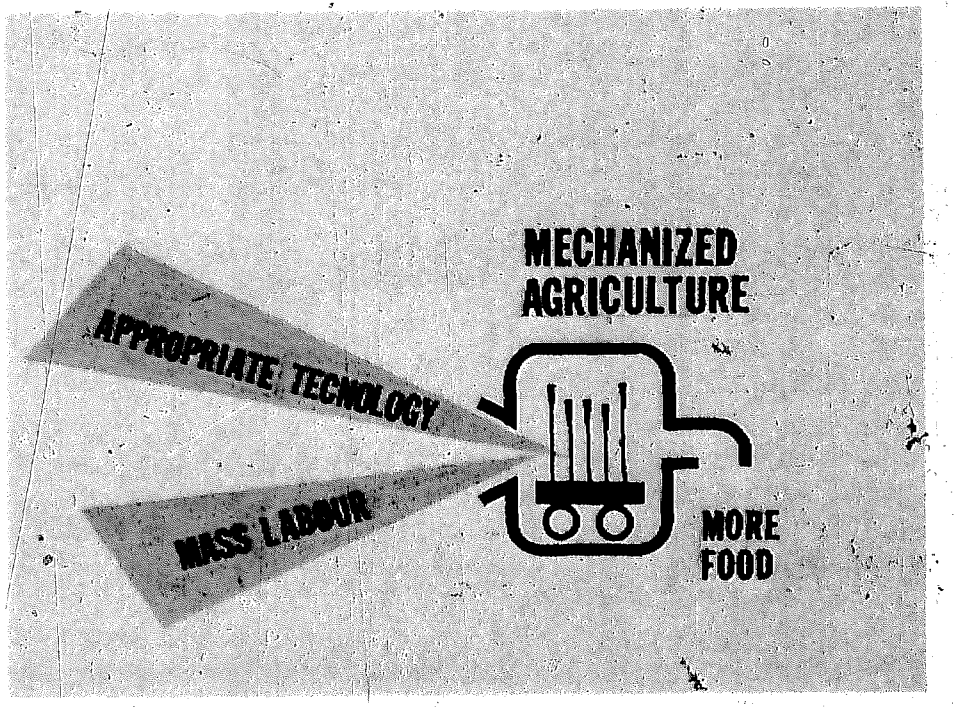
The action probe goes beyond the standard social analysis of knowledge levels, attitudes and behavioural patterns and into the dynamics of the social process. Its principle is to expose the mass to a communicative experience through a defined stimulus, a message or an action, to measure and analyse reactions of the mass, to modify the action according to the new criteria developed and finally to expose the mass to a renewed, modified action in a continuous interaction.

The process of social development must start somewhere. A sincere leadership, committed to the principles of mass democracy, will with a basis in available information and to the best of its ability take a decision on an action, implement it through the channels of communication it controls, observe the signals of the mass and ultimately reflect and modify in accordance with the wishes of the mass. An inspired leadership will provide momentum in this continuous process.

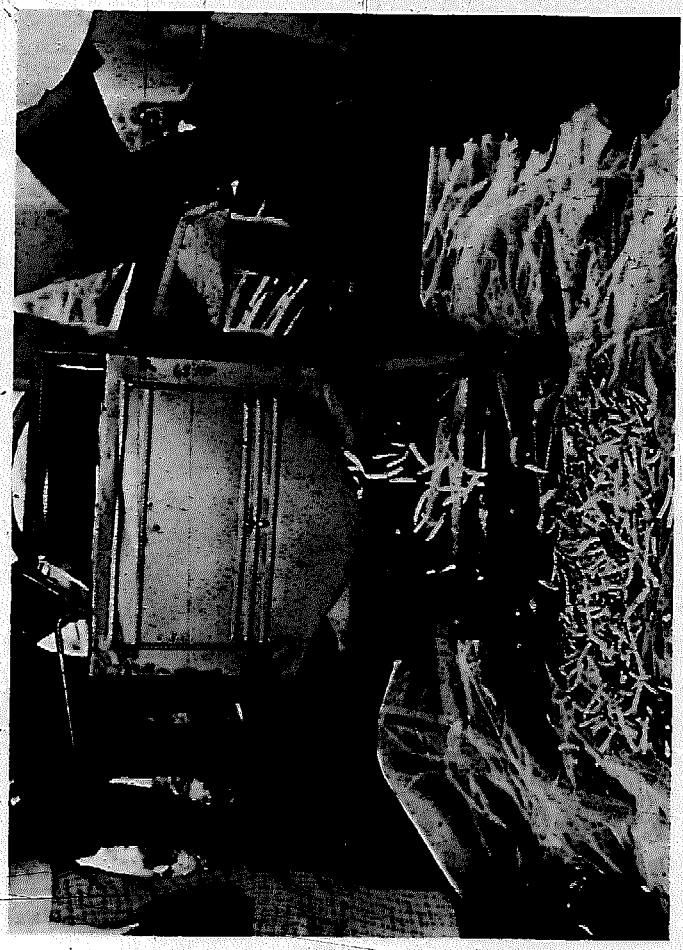
What is, more specifically, the role of appropriate technology in such a frame of reference? The components are mass-labour, self-reliance, appropriate technology and the principles of the communicative mass democracy. The basic assumption is, moreover, that the process of overall social development must start in the rural areas.

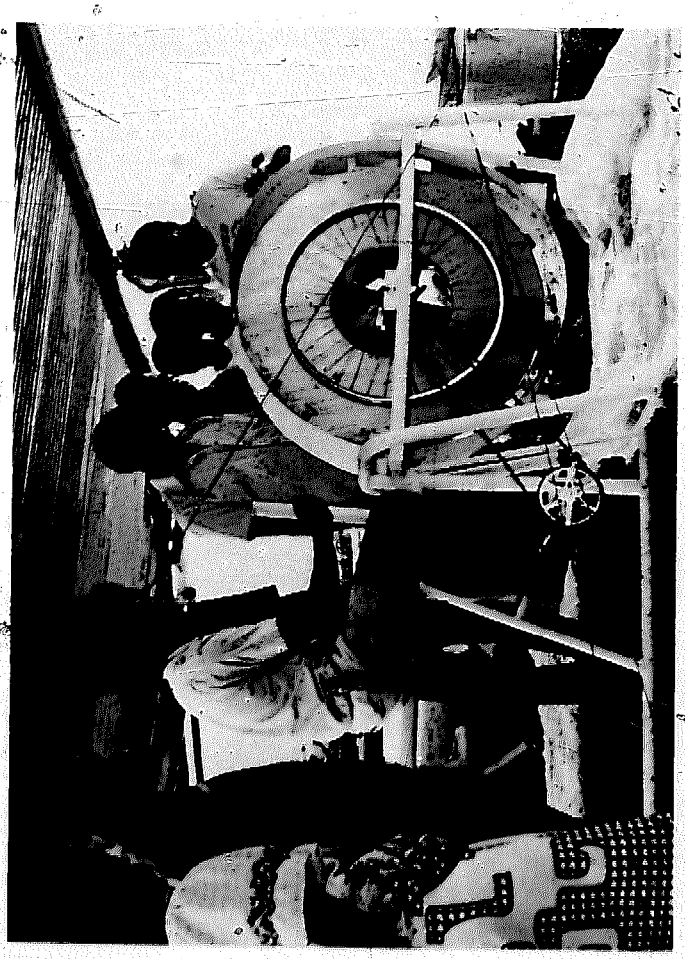
Against this background it can be understood that appropriate technology is not a panacea for development but just one of a number of equally important and interrelated inputs in the development process. In general terms one can say that the purpose of appropriate technology is to improve the quality of life in rural areas. The concept becomes, however, considerably more operational if we assign to it the more specific task of improving production in rural areas, i.e. agriculture. From this standpoint, appropriate technology is roughly synonymous with the mechanization of rural production. Under this label it is historically and empirically well known and its role can be fairly well defined.



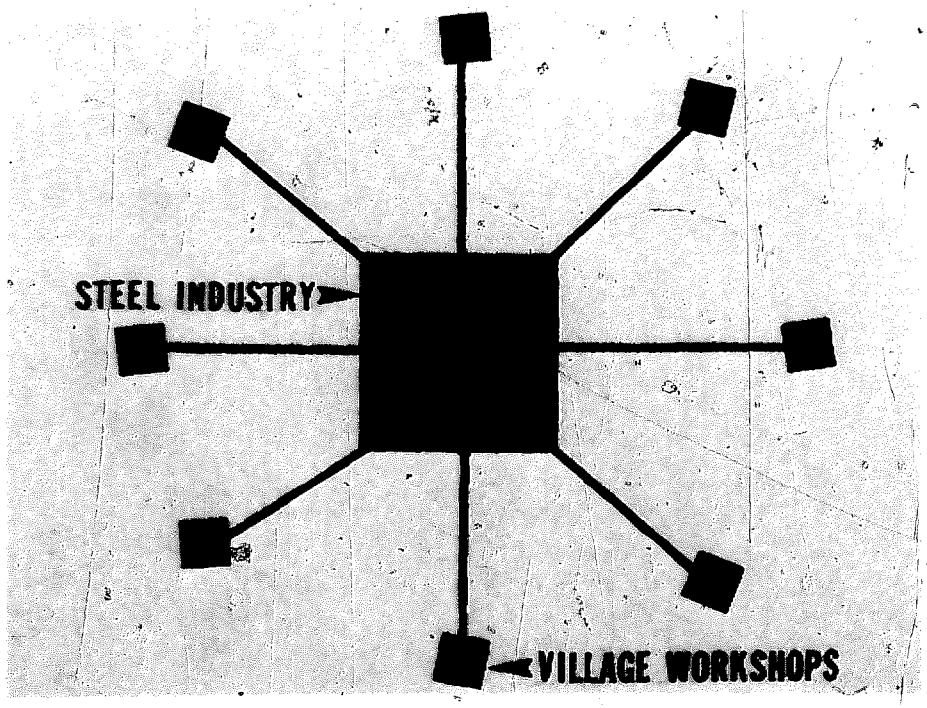


If the advocates of the concept of appropriate technology inflate it by including everything, it will achieve nothing. It may be useful to examine it from various viewpoints. Assuming that in the course of socio-economic development there is a continuum from a labour-intensive to a capital-intensive technology, a school of thought uses the label 'intermediate technology' for the type of low-cost tools and equipment applied in the 'intermediate' stages. Appropriate technology is a label referring to what is best suited for production under the local circumstances. If a continuum of earthmoving equipment is basket—wheelbarrow—horsecart—lorry—heavy-duty 'earth mover', a wheelbarrow and a horsecart are intermediate technologies, but if steep slopes do not permit horse-drawn equipment, the wheelbarrow or maybe even the basket is appropriate technology.





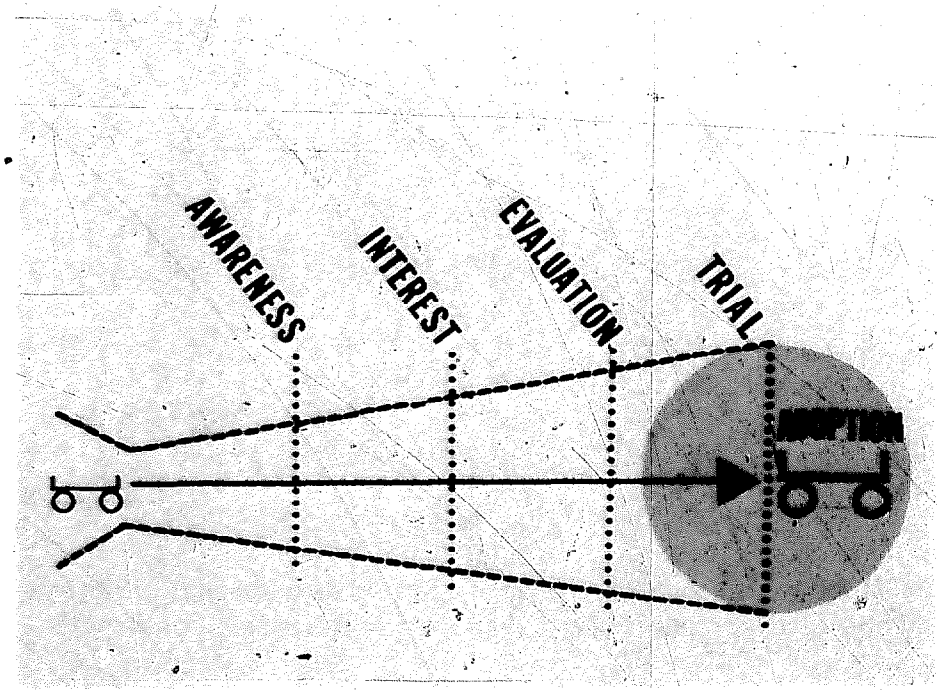
Those who consider recommendations on appropriate technology in various rural work situations should probably bear in mind that its ultimate purpose is to help the farmer or labourer move from a subsistence level to a level of capital accumulation. In other words the question is: HOW MUCH SURPLUS DOES IT CREATE? The effect of an appropriate technology is limited to the surplus it can generate. Against this background it can hardly be doubted that there appears to be a general need for appropriate technology, but the policy discussions on the issue often confuse this general need with the special need. Even if there is a general need, there may not be a special need for a technology. The latter is relative to the degree of appropriateness, as objectively assessed, for example, by measurement of work performance in situation A or B. There are also the 'felt needs'. The individual farmer may for a number of personal reasons simply feel that the new plough is or is not appropriate. A government which has a policy of Another Development may feel that a technology is not appropriate because it is not friendly to the environment.

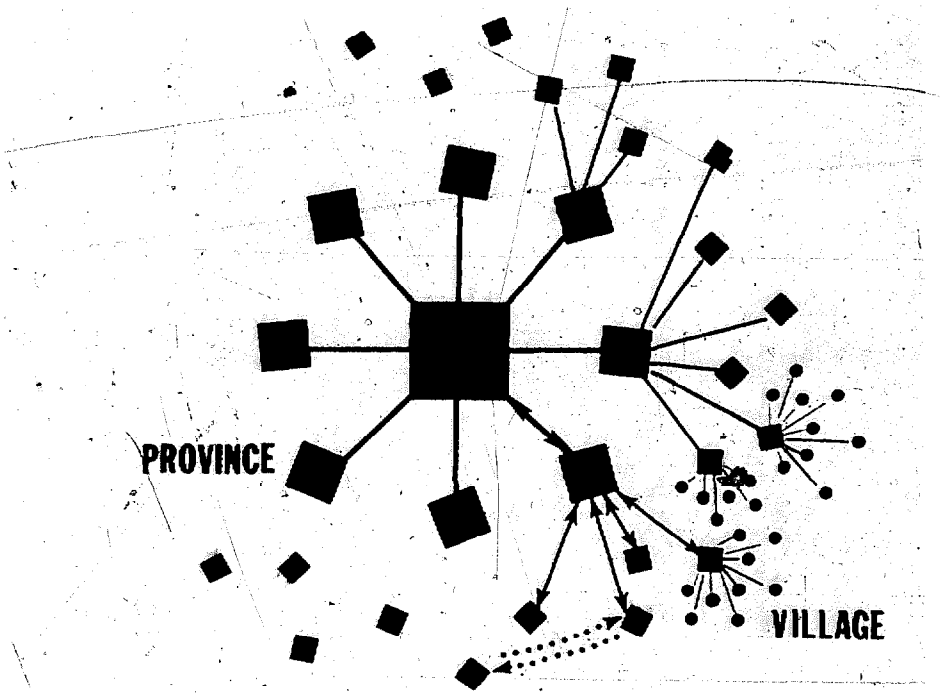


The value system under which an appropriate-technology input is going to function is therefore clearly decisive for a judgement about its appropriateness. Let us, however, suppose that social development is synonymous with economic development and that our objective is rapid economic growth. The relationship between a capital-intensive and a labour-intensive technology needs further consideration. Political decisions must be made as to what and how much society wants from an input of appropriate technology. A labour-intensive technology cannot totally substitute for a capital-intensive technology. The problem is, in a national context, to define the areas of production in which a substitution is possible and desirable. A likely combination is, for example, a capital-intensive core technology, e.g. an iron and steel works, combined with small, labour-intensive village workshops for the production of tools and training of blacksmiths. An overall national plan is needed.

Uncritical diffusion of appropriate-technology models at village level may, however, do more harm than good. There is need for a structured, distributive communicative process. The purpose is not only to increase agricultural production but also to reduce urban migration by increasing employment in the countryside. There are clear lines from the concept of appropriate technology via the concept of agricultural mechanization to a comprehensive policy of rural industrialization in terms of small industry.

Production and maintenance of even a very simple appropriate technology calls for a division of labour in the process. In terms of productivity the rationale is, then, self-reliant small industries based on local resources but with the national supportive system that is necessary. The local blacksmith is an indispensable specialist on whom the local group of farmers will depend for repair of their equipment. Both the blacksmith and the farmers will depend on a larger mechanical workshop at the province level with more sophisticated equipment for production, repair and supply. And this unit is in turn dependent on a national steel industry or supply service. In practice interaction will develop very quickly both horizontally and vertically in the network.



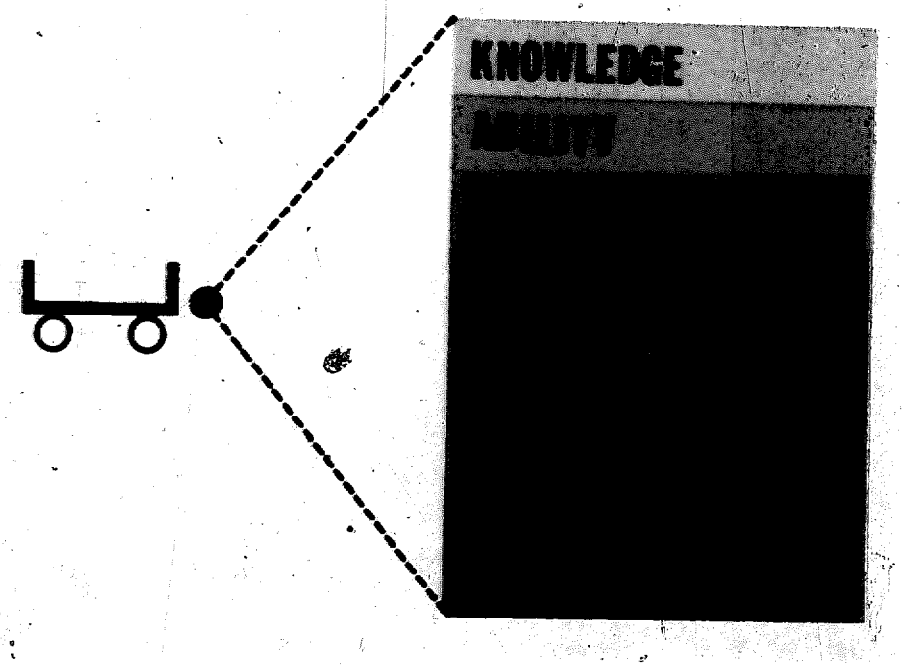


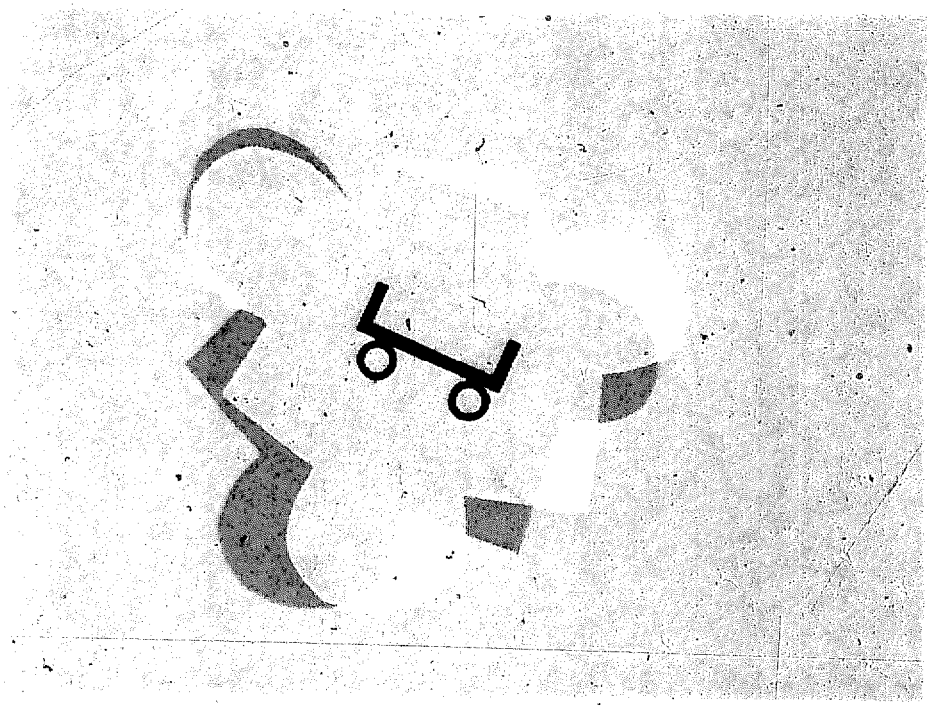
Such a bird's-eye view of a national distribution and maintenance network for appropriate technology at the physical level vividly illustrates that it is a technology for the mass and notably for a mass which has little or no experience in handling it, otherwise the need for distribution would not be there. Distribution of appropriate technology is in other words also a question of mass education, or diffusion of innovations as it would be called by some communication scholars. These scholars postulate that an individual passes through four cognitive and behavioural stages before deciding to adopt or reject an innovation (17, 18, 19):

Awareness: when the individual learns about X for the first time;
Interest: when the individual is stimulated enough to search for detailed information about X;
Evaluation: when the individual assesses the viability of using X in terms of his own needs and values;
Trial: when the individual actually tests X to ensure that it is worth while.

There is a substantial and interesting body of documentation from the school of research which has developed in this particular field, which the reader may refer to in the literature list.

The definition of appropriate technology, as the technology which is best suited under the local circumstances, indeed makes those circumstances as important in the context as the technology itself. The special and felt needs for a technology are so closely related to these local climatic, geographical, physical and cultural circumstances that one may ask whether it is probable that any technology introduced from the outside can be appropriate at all. Maybe the ultimate criterion for appropriateness is found in the technology which has arisen spontaneously in the local situation as a result of meaningful interaction between *Homo sapiens* and his environment. This adds another dimension to the notion that appropriate technology is a matter of mass technical education.



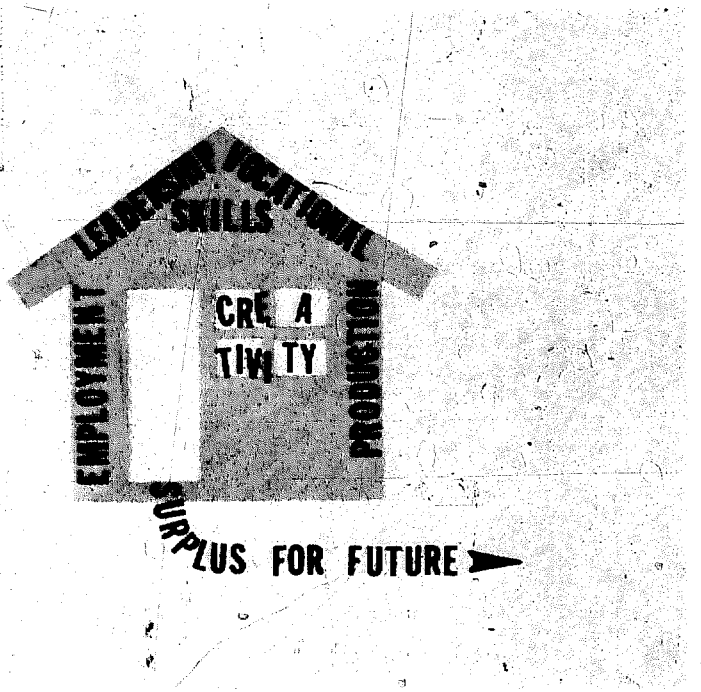


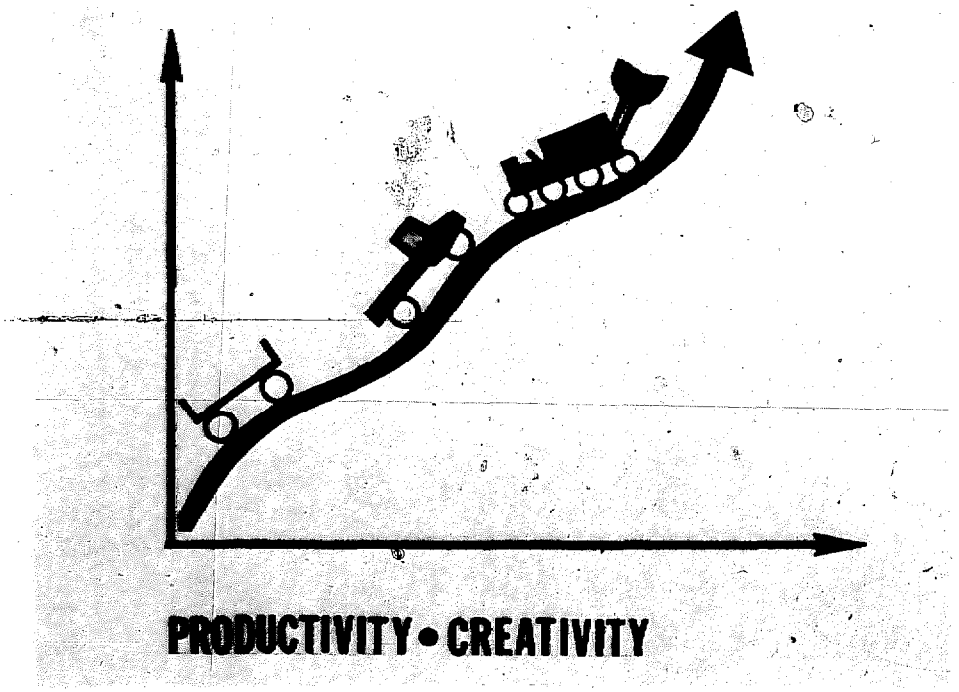
What are we trying to do when we introduce appropriate technology as a vehicle for development? Are we trying to 'sell' HARDWARE A or B? Or are we trying to communicate the IDEA that there may be alternative ways of doing things, such as A and B? Or are we doing neither, but rather trying to communicate KNOWLEDGE for solving problems? Or is it perhaps an ABILITY to analyse and evaluate technical problems and find solutions for them that we are trying to communicate? Might one say that behind it all we are actually trying to communicate an ATTITUDE to life under difficult conditions, namely SELF-RELIANCE? So, finally, is it BEHAVIOURAL CHANGE that it's all about?

If that is the case, communication of appropriate technology is a considerably more complex thing to plan and implement for a government than distributing small hardware in the countryside.

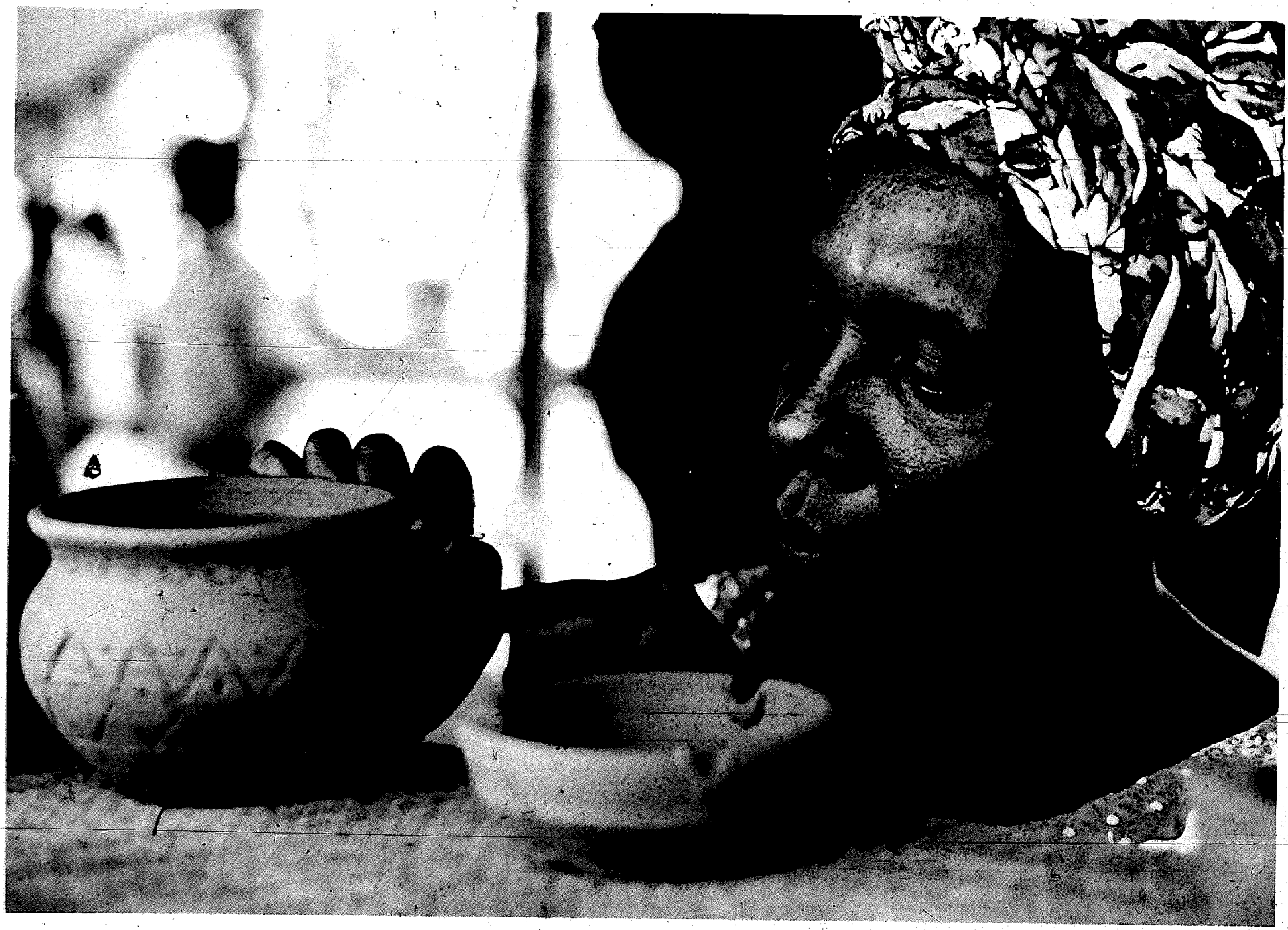
Drastic educational reform becomes imperative in any society which sets Another Development as its goal. The prevailing system must be measured by the attitudes and vested interests it produces, ranging from pseudo-academic ambitions to scorn for manual labour and rural life. The middle-class mind poses a re-education problem of its own. It has a very small role to play in the rural animation process, the whole idea of which is a self-reliant (sometimes self-sacrificing), creative and problem-solving approach to life.

The cadres of rural animators that are so crucial to the leadership can only be educated at the point of action. The network of provincial and village workshops for appropriate technology must also be made part of a new educational system that develops vocational skills and leadership abilities, provides employment and generates the production surplus on which all future development depends (10).

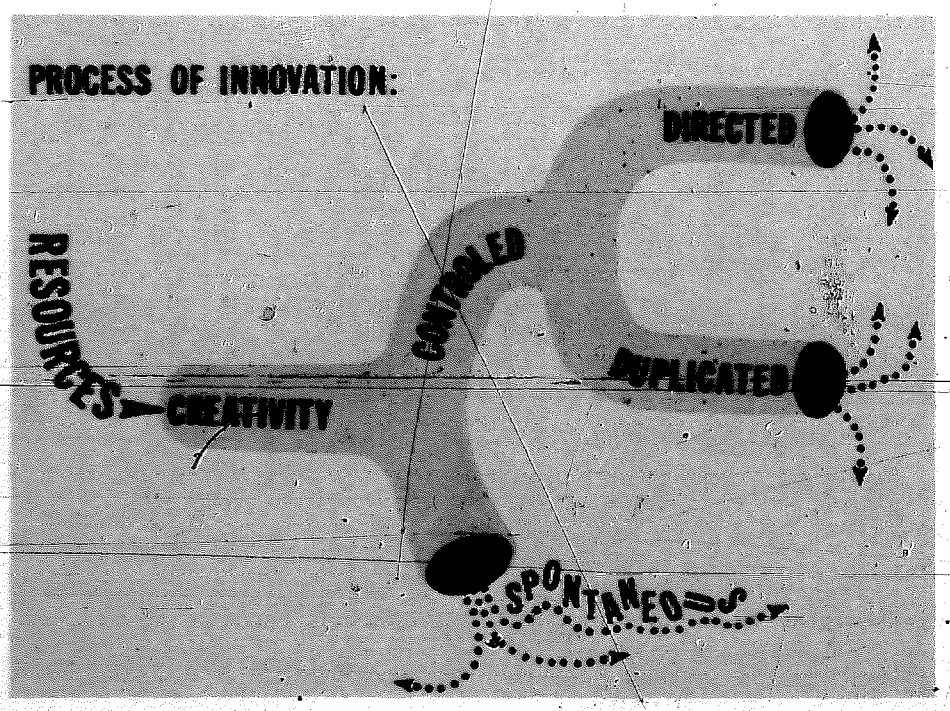


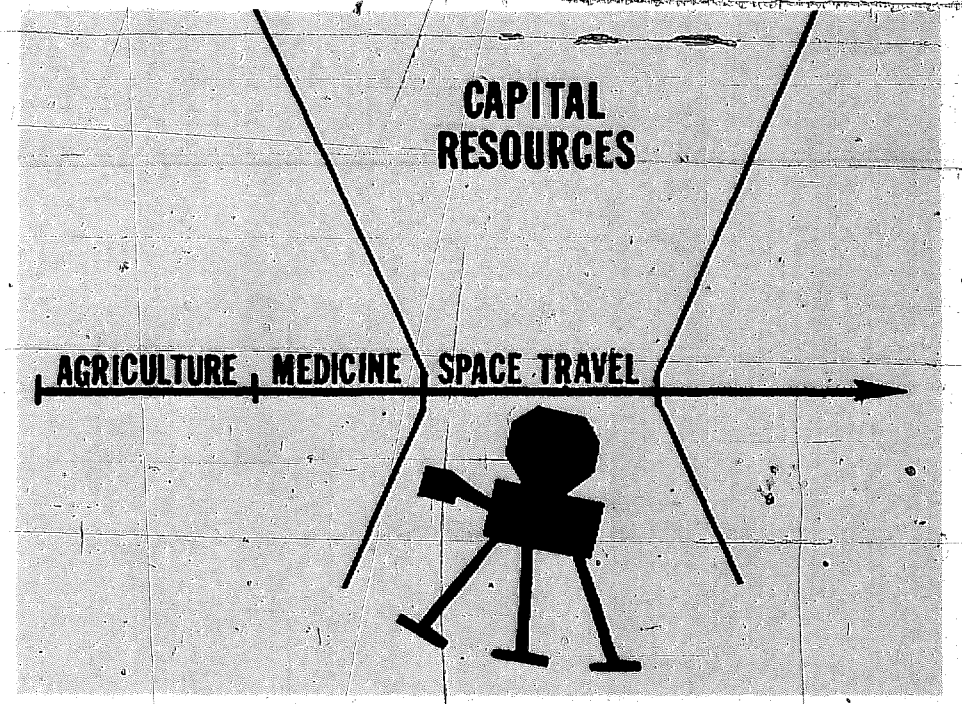


The role of any technology, capital- or labour-intensive, is limited to the surplus it generates. Yet, when a country's economy continues to grow, it is mainly because that country's technology continues to develop. New ways of applying existing technologies and the invention of entirely new technologies are continuously increasing productivity. The core in any process of economic development is in other words CREATIVITY or INNOVATIVENESS and the ultimate objective of attempts to communicate the notions of appropriate technology is to stimulate such abilities. If this perspective is considered valid it evidently has drastic implications on HOW the leadership conducts the communication policy.



The question is, then, under which physical and psychological conditions is man's creativity best stimulated? Some interesting observations can be made in industrialized countries with their highly capital-intensive technologies. Results in terms of new research discoveries or technological innovations are largely a matter of resource allocation decided by industrial or social priorities. When huge capital resources are poured into a narrow area of research or technological development over a long period of time the results are bound to come. Highly skilled and paid brains, often gathered in 'think-tanks', are the core of this system. The process is a continuous interplay between creative idea, hypothesis and empirical assessment. It works with enormous redundancy. Only a tiny fraction of the output of ideas and innovations survive and contribute directly to increased productivity. It is a chance process, a matter of the lucky combination coming together in the brain cells, whereby spontaneous creativity independent of the capital input may also arise and produce important innovations.

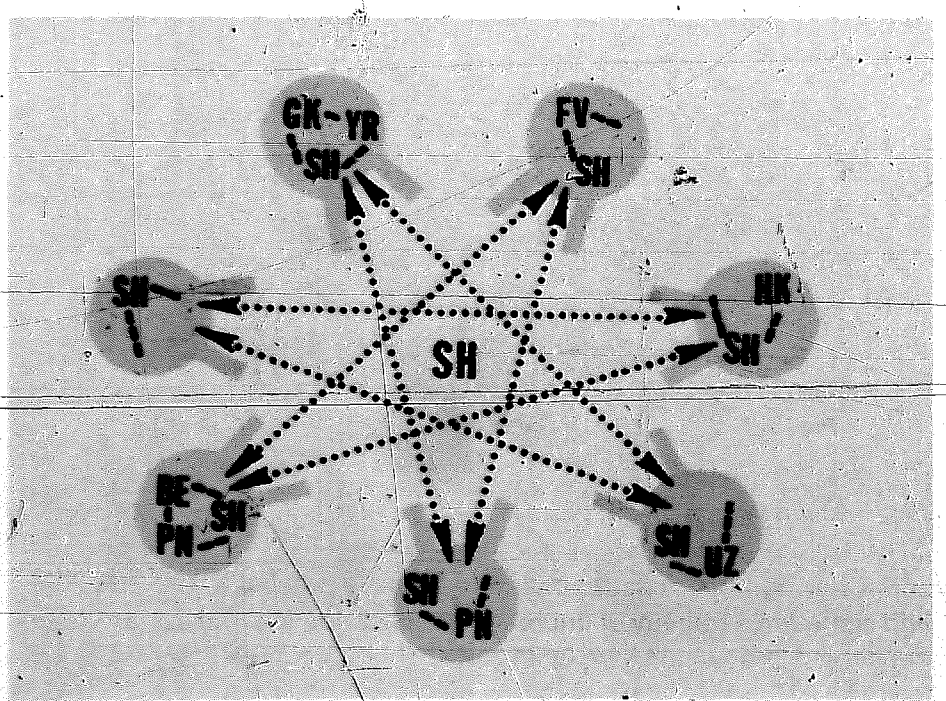


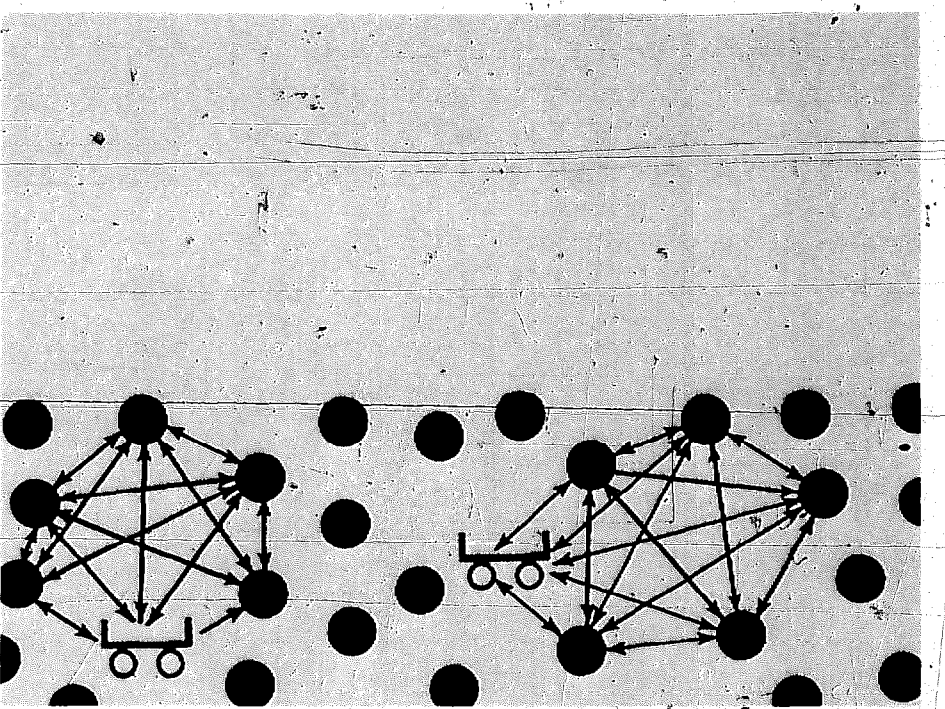


Efforts to organize or control the creative process are thus ultimately concerned with increasing the probability for the lucky combination to come together. This, again, implies a system which allows for a 'free flow' of information bits or ideas. The scenario in western industrialized countries provides significant illustrations in this respect. Important innovations are made by the industrial complex itself, by individual companies, by their trade institutions or by associated universities which operate under the principle of freedom of research and investment and which through resource allocation can direct the creative process towards areas they consider important. The governing bureaucracy, which represents a cluster of limitations, has a minimal part in the process.

In less-developed countries there is no industrial or economic base to support a high-skill, capital-intensive creative process and the paradox and sometimes tragedy of uncreative duplication becomes a fact. Ideas are copied, innovations are imparted and national creativity and innovativeness is extinguished.

This demonstrates clearly that the alternative model is development based on labour-intensive technology and that this appropriate technology itself must be mass-based. It can arise only from the creative potential of the mass itself and it can therefore contribute to development only through the total mobilization of the mass. The advocates of appropriate technology have not themselves been particularly innovative. Technologies are too topical and conspicuous. Demonstrations of technological function are certainly valuable as action probes, but they have merely a minor role to play in an innovative process that can only be triggered through massive and structured political movement.

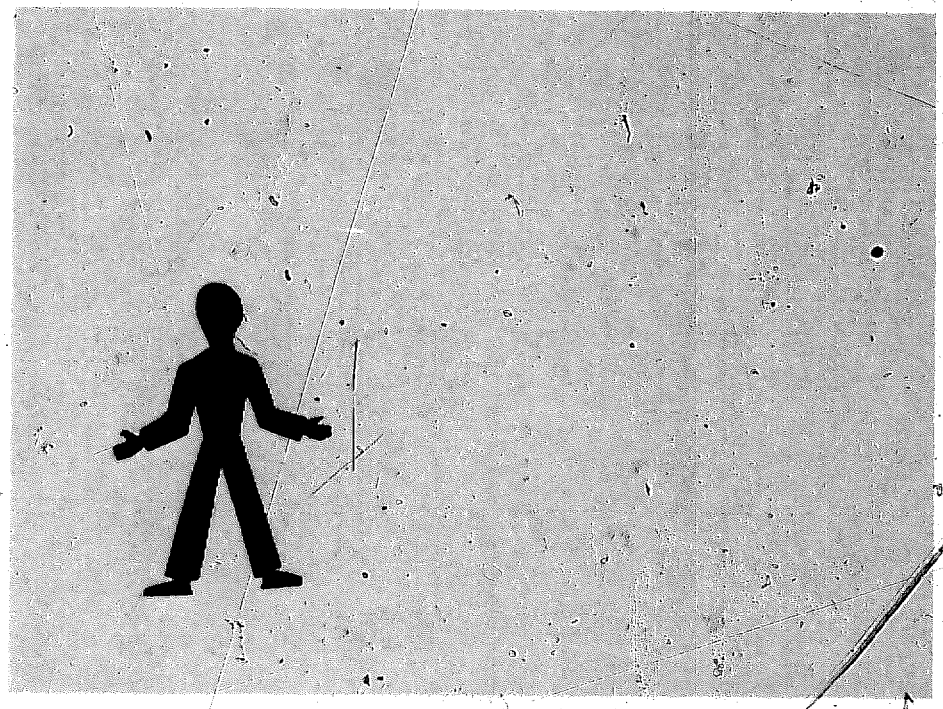




The managerial aspects of a mass campaign are today surmountable. More knowledge is needed on the communicative method by which the mass can mobilize itself. Perhaps we should examine not only the function of the school, but also the function of the animation or learning process. The group is the mechanism through which the mass releases its creative potential. Maybe it is not the case that learning leads to development of the individual, rather that the development of the individual as a group member makes learning possible.

A good group animator knows that the word is the beginning. Words are signals for experiences. Some words are signals for shared interests. Through the dialogue there emerges a common understanding of the social reality and of the group's interests in it. Through understanding, decisions emerge on creative actions to change that reality and through decisions motivation emerges to carry the changes through.

Are the Third World countries in search of a new system of government? Are they seeking for a national leadership that can neutralize the vested interests and merge them in combinations of shared interests through which communication can freely flow? Is the purpose of development the realization of the creative potential of some men or of all men? The answers, of course, lie at the point where scientific observation becomes political belief.



WORDS AND OTHER THINGS

If a thing, an object, a plant or whatever has no use, it has no name either. In my experience this feature seems to be common for tribal languages and village communities in subsistence economies all over the world. It says something about man's rational approach to his daily practical life in spite of the fact that it is so interwoven with his spiritual life. The word is the beginning.

When the farmer tills his land and the woman hoes her garden, they are not doing just that, they are really performing sacred acts. People's language and attitude to talk and the use of words and names reflect this fact.

My language and my thought reveal my limitations in understanding this phenomenon by the very way I have expressed myself so far. I am habitually resorting to a practical-spiritual dichotomy in order to explain what I mean, whereas the phenomenon—the farmer's perception and experience—is that of 'one-ness'. His reality is not divided into some things that are spiritual or sacred and some that are practical or profane. If you ask me how I know that I can only answer that I sense it.

The villager lives in a here-and-now world. His perceptions are concrete. There is no difference between the name of the thing and the thing itself. That is why he treats words and things with much greater reverence than a man from an industrialized country.

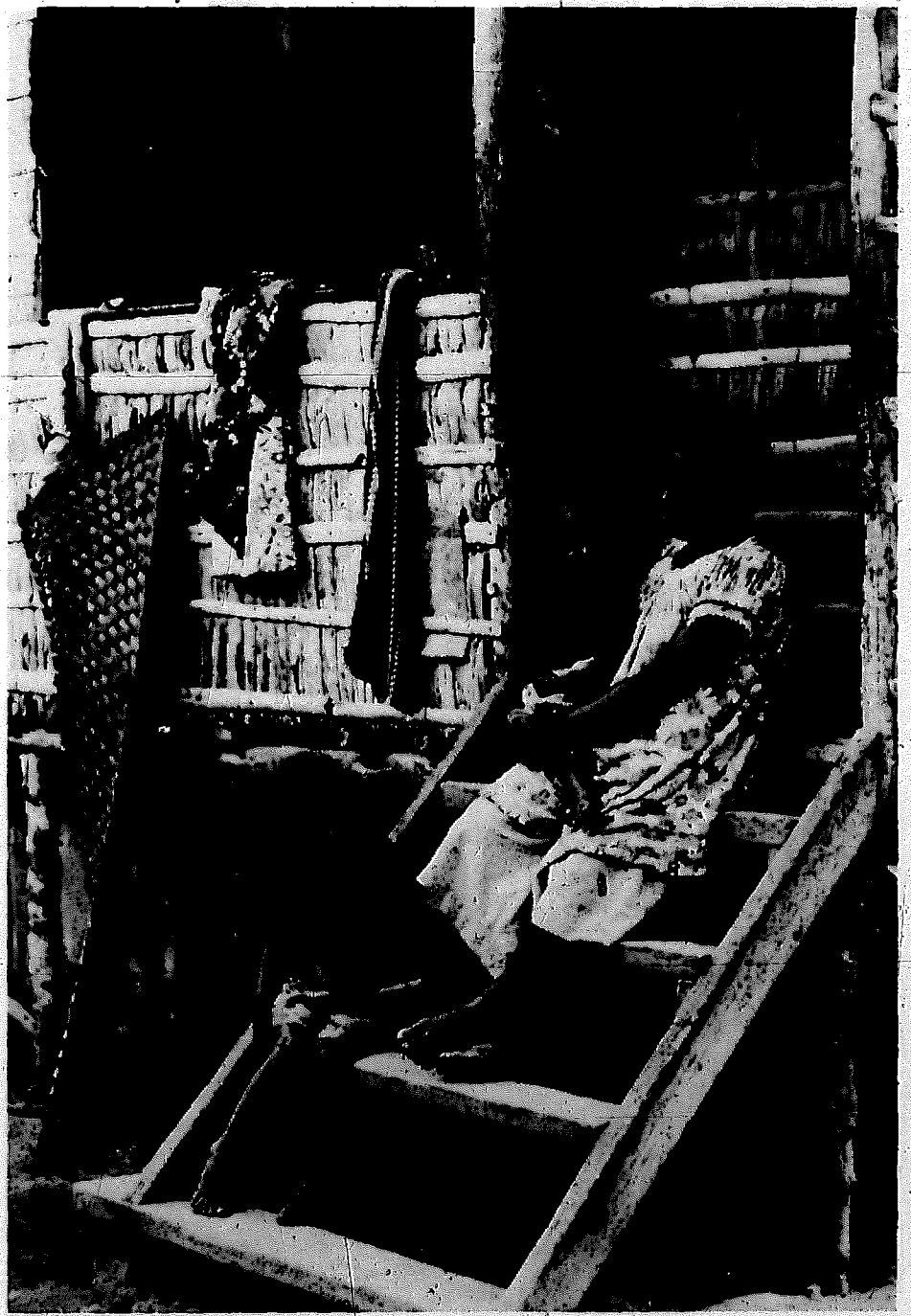
Western languages and cultures are built up on the 'two-ness' of the world, the abstraction, the dichotomy, the concept of the logical universe: either this is a stone or it is not a stone and if it is not a stone it is all the rest of the world except the stone. Our science and industry are built on the invention of the negation—stone/not stone—and its logical irrefutability. It introduces the time factor in the language: a stone cannot be a stone and not a stone *at the same time*. If we insist that it is, we introduce a contradiction in the system and our logical world collapses.

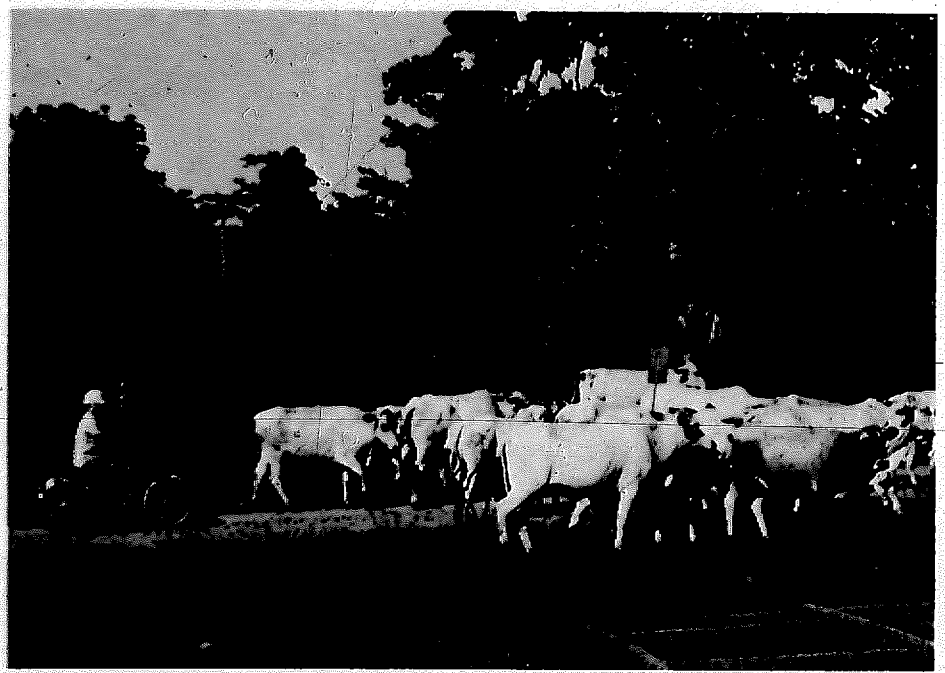
The whole of computer science is based on the binary code: yes/no. The perception of passage of time/simultaneity of events develops into the concept of causal connexions and it is expressed in western languages by certain clues, for example the words *because*, *if*, *when*, etc. Simultaneity is expressed by words like *and*, *also*, etc.

It is my experience that such concepts often do not exist in tribal languages. The reason is again very rational; there is no use or need for them. The illiterate villager does not usually think in causal relation-

ships, although he can very quickly learn to do so. When you perceive the world as a state of 'one-ness', the only rational way of explaining events is by way of similarity. The notion is that objects or events which appear similar are connected. This type of belief is expressed for example in some of the behavioural taboos expressed colloquially in village communities: Women should not eat birds. If they do they will go from husband to husband like birds from tree to tree. If children eat eggs they will become bald as adults. And so on.

Once the premiss is understood, this is a very rational way of thinking. We should be very careful not to use the word 'magic' in a derogatory sense. However, experience will probably in the long run confirm that this approach does not have very good effects in man's attempts to control his reality and the supernatural. There my language traps me again! There is nothing supernatural in the illiterate villager's world of 'one-ness'. The spirits are as real as the rocks and the trees. This way of perceiving reality should not be called primitive, nor is it inferior. To have no perception of the 'one-ness' of the world is not a psychological advantage. It is a tragic loss, a price which the western civilizations have had to pay. The invention of the dichotomy and the negation was the basis for what we usually call progress. To make the 'two-ness' of the world bearable, we also had to invent eternity. That concept resurrects the 'one-ness' of the world.





Of course, the spirits are there. The 'one-ness' of the world gives man too the beautiful opportunity for creative expression in it.

People who have worked much in villages may have made the same observations as I have done that illiterate people have very good memories. Stories are retold in the most minute detail. Unbelievably complicated work instructions are understood and followed immediately, that is, if there are no particular motivations for forgetting something. Old people excel at remembering the event which happened two rain seasons after the volcano eruption, etc.

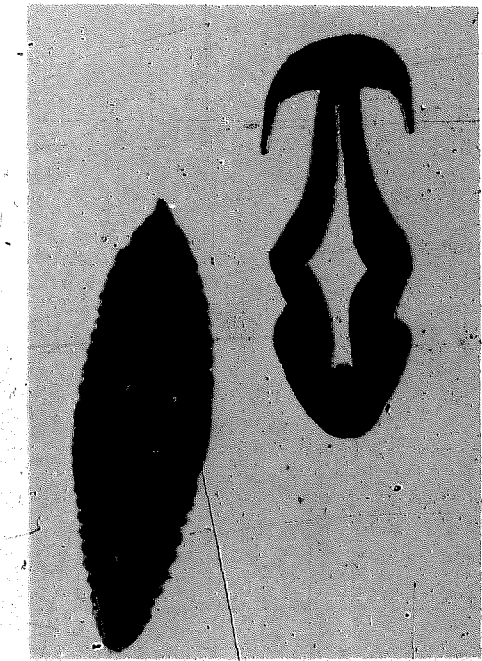
Obviously people develop this kind of ability when there is no written language available for information storage. The whole culture is based on oral tradition. This is why the old people are so powerful. Theirs is the knowledge of the kinship rules that govern behaviour, of the beer-brewing, the gardening and the bush lore, and they know it. You have to listen to them if you want to survive in the village community. Together with this huge memory potential goes, in my experience, a particular ability to visualize objects and events. Most of us can close our eyes and 'see' at will people, friends or whomever, objects, events, on the back of our eyelids, sort of. Just as we sometimes 'see' in a dream. Some people have an ability which goes beyond this and they can 'see' persons or objects not on the back of their eyelids, but with open eyes projected into the reality in front of them. The phenomenon is a brain-function and is well known by psychologists under the name 'eidetic ability'. In my observation many illiterate village people have retained that particular ability. With increasing literacy and pictorial stimulation, this highly creative ability disappears. I am convinced that there are spirits in the villages and they are perceptually as real as anything else.

The reader may not agree with me, but I believe that our understanding of such fundamental questions has strong bearing on our ability to communicate appropriate technology. It points far beyond the standard procedure for physical demonstration of the function of the technology and indicates that development of concepts, or rather, change of concepts is the ultimate issue. Whether such a change of concepts can come about through an agent like appropriate technology or whether it requires a more comprehensive approach is partly an empirical process, partly a matter of political belief.

Science and technology, however simple, are built on concepts like causal connexion, the laws of nature, the negation, etc. and can only be understood through the process of acquiring these concepts.

If the instructor says, 'These bricks are cracked because the fire in the kiln was uneven', or 'This hydraulic-ram pump does not work because the water flow is too small', or 'It is easier to press the palm oil out when the nuts are cooked and mashed first', it is likely to be understood not as a causal connexion, *because*, *when*, etc., but as a simultaneity in time, *and*. For example, 'This hydraulic-ram pump does not work *and* the water flow is small'.

I am not saying that people are not capable of understanding. I am just trying to explain communication problems. If the cause/effect is close in time and it is possible to explain and demonstrate it concretely, people are quick to take to the practical implications of it. If the cause/effect is not close in time and cannot be demonstrated visibly, the instructor has to turn his explanation into the abstract and it becomes difficult for people to understand who do not yet command the necessary concepts. And it becomes almost impossible when the explanation entails reference to ratios, percentages, measurements or quantification, a type of information which cannot be stored and processed without certain conceptual tools that the illiterate does not yet have. Technological innovations and ideas very often involve use of such references and appropriate technologies are not totally exempt from them.



There is in this situation, in effect, a communication gap. But why should we expect the illiterate villager to adjust to the way of thinking of the educated man? Why should he alter his perceptions of the world in order to understand 'us'? Is there nothing for us to learn from him? Is development a one-sided process of duplication? Or could it be a process in which both cultural parties achieve a better and richer quality of life? It is perfectly possible for an educated man to adjust to the concepts used by the illiterate villager, but he has to study them.

In many villages they do not use measures, because people's life style is such that they have no need for it. In other villages people may measure the size of houses, fields or gardens in 'paces', which are sometimes called 'feet'. The area is measured not by multiplication but by addition of the length and the width, which is a very practical way of deciding the size of an area. The fact that the height of the house is lacking does not disturb anybody since there are most often clear limitations as to how high a house can be built in a village. However, if the technical expert does not mistake the expression 'foot' for the English foot, he will be disenchanted by the fact that a 'pace' is not a fixed standard measure. It will vary with the man who is doing the pacing. In villages I lived in in Zambia, people were perfectly happy with that, because they knew the man.

Maybe things are not so different in Papua New Guinean villages? Is anybody trying to find out?

Another interesting thing is the time concept. There is something we could call 'village time'. It is not measured in hours, minutes or seconds, but in seasons and moons. People rise and go to bed with the sun and assess the passing of time by judging the position of the sun and they have very often a refined sense for the stage of the light, which tells them 'what time it is', for example in the evening.

Women would, for example, tend to measure the time by the chores of the day, which are very regular in a village setting. There is the time for gathering firewood or making the fire. There is the time for weeding the garden and the time for preparing the big meal of the day.

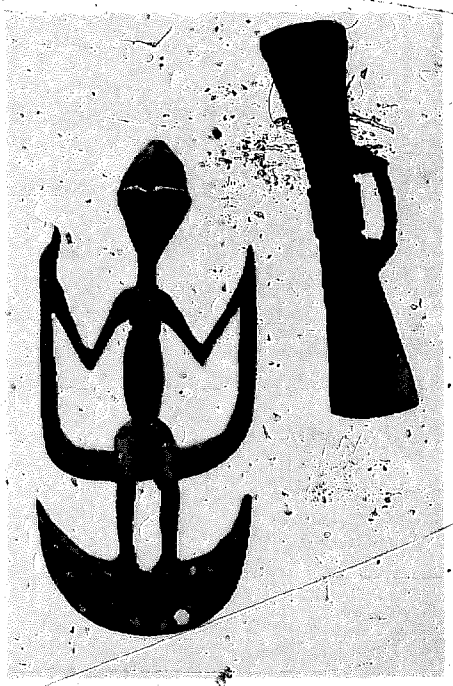
So, when we try to introduce appropriate technology, should we not perhaps recognize people's rights not to be disturbed during the village 'office hours'?

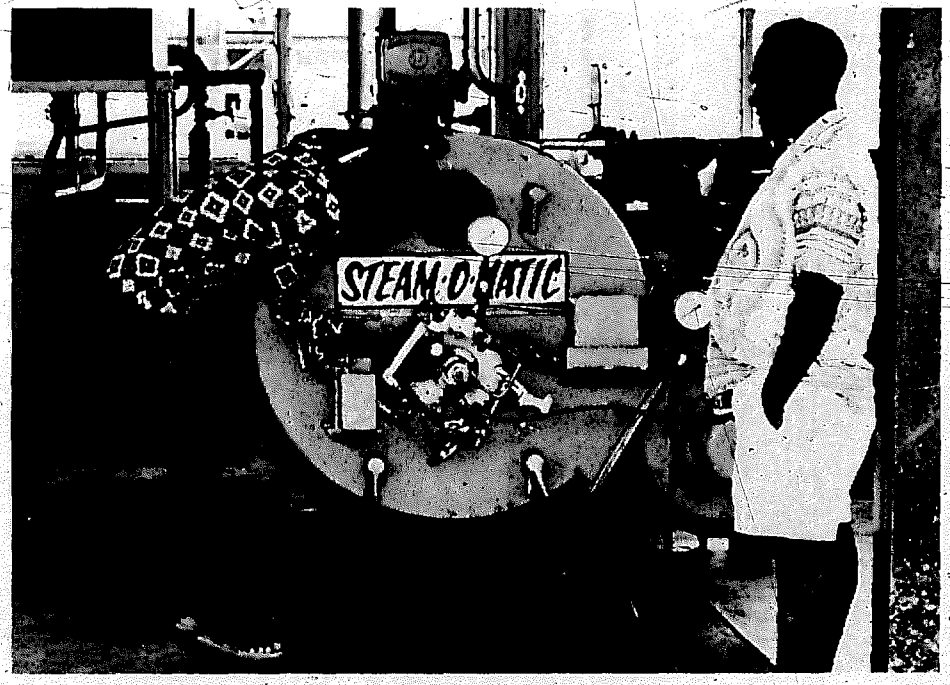
Nutrition and technology connected with processing, preservation and preparation of food have been considered part of the appropriate-technology programme. The time concept is used in recipes and in measurement of the readiness of, for example, a cooked, baked or smoked food item. But it is not sixty minutes which makes the bread ready; it is the baking. If cooking habits are to be changed, one must first change the concept of readiness. So, the first question is: what is the present concept of readiness for a particular food item among the women of this village?

Here I shall not go into the communication problems that are likely to occur when dealing with weight, volume, blue-print drawings or photographs but just emphasize that in my experience attempts to communicate even the simplest technical idea in the village are likely to bring about reactions that are unexpected and surprising to the communicator. These provide the crucial moments for self-assessment during which the communicator may or may not recognize that there is something wrong with his or her way of communication rather than something strange in the villagers' way of understanding the approach.

It is vital for the success of any programme attempting to communicate appropriate technology that it should have an in-built system for continuous assessment and evaluation. First, the task is to assess what kind of concepts exist in the villages relevant to the technology in question and how they possibly can be modified. Second, it is to assess how the concepts of the technology itself can be expressed in modified terms. It simply works better if we continuously talk the same language. Genuine transfer of technical knowledge depends on what I would call 'appropriate conceptualization'.

In many rural subsistence-food cultures all over the world the language has the same word for food as for the main staple in the diet. I am told it is also so in Papua New Guinea. The word for TARO and the word for food are the same thing!

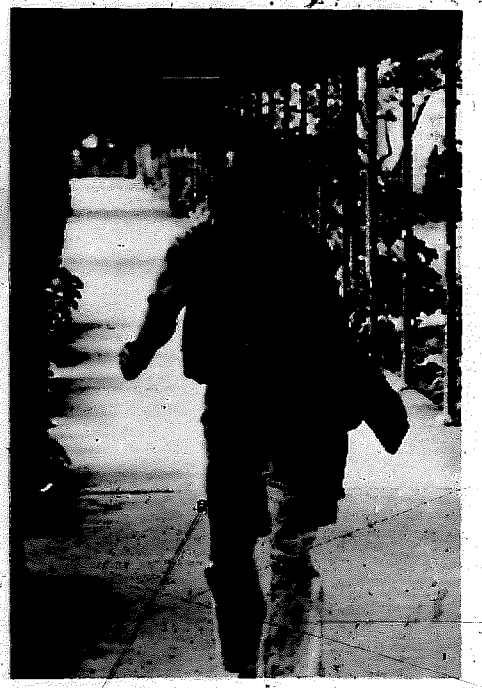




Tonie Putter, who was a teacher in the workshop's agriculture course at Vudal, gave an exciting story of the 'magic' of the taro plant and, indeed, also of the beautiful 'one-ness' of the world of the women who raise it. The taro is attacked by fungus diseases which spread from plant to plant through water and contact. Observation confirmed that one drop of water with fungus from a diseased leaf could pass over five other leaves before it reached the ground. The chemical spraying solution is hardly an appropriate method in a subsistence horticulture. However, the disease can be controlled by other means, for example, by simply increasing the distance between the plants. But if there is land pressure in the area that is perhaps not the most suitable means. Another way is to base the cultivation on the most disease-resistant varieties of taro. And what did she say, the old village woman who had sixty-five sorts of taro in her garden and who knew the name of every one of them? (Everything which is of use has a name.) Would she be willing to throw away the plant which gets the disease easily? She looked up with big eyes to that incredible question: 'But that would be MURDER! The taro has a soul, I cannot throw out one of my children!'

I know I am walking a razor's edge between an advance in knowledge and a retreat to romanticism. The experience of 'one-ness' with the world is both intellectual and intuitively emotional. In development work the latter should also have its place. Another Development is so far not much more than an attempt at establishing another set of values.

Perhaps that aspect is understood better through a more sensitive observation of and interaction with people's creative expression, through the myriads of myths and legends and through the physical art forms from painting and sculpture to body decoration and dance. I have never been able to perceive that that world should be so full of backward attitudes, misleading thoughts and evil spirits, but a foreigner



should not really write the last word about it, so I give the pen to a Papuan. His name is Monkunu Kokare (4) and this is what he says about it:

'Now that I have grown up, and travelled, and begun to understand something about the wider world which surrounds us, I am starting to appreciate some aspects of my early years in my village, which I did not have the capacity to understand at the time. I did not understand these things because I did not even think about them, but now I realize that one of the most significant aspects of my early childhood was an overriding, all-surrounding sense of security. I sometimes think it is a pity that we so often have to grow up and lose these things, before we are really able to appreciate them. I mean that, from earliest memory, when I woke up in the mornings, the first thing I would become aware of was my father, still asleep on the floor beside me. He was big and strong and warm, and I used to pull the blanket over my head and listen to his breathing, along with the birds in the bush outside. Sometimes, on those mornings, I would hear the creek running very fast. Then I knew it had been raining during the night, but this did not happen very often, because mostly the heavy rain falls in the afternoon. But on those mornings I would just lie there and listen to all the noises outside in the bush—our bush, my bush.

'Sometimes my mother would already be awake, and I could listen to her walking around very quietly, murmuring to herself. I could always tell what part of the house she was in from the way the limbum planks in the floor creaked. If she was downstairs in the kitchen, I could hear the fire starting to crackle, or I could hear her rattling coconut shells together. Soon after that I would smell the smoke filtering softly through the woven bamboo walls. There is a very steep hill near my village, and it is a long time after first light before the sun comes out over the top of it. If I was still lying on the floor under my blanket when this happened I could watch the sunlight coming through the cracks in the walls or the shutters over the windows. Some mornings I could see the smoke coming through too, and then the strong thin sharp shafts of sunlight would cut through the soft hazy drifting curtains of smoke. I have always been fascinated by the interaction of sunlight and smoke. Even now, when I am helping to clear a garden, I like to watch the thick white clouds rising to meet the sunlight as it comes filtering down through the trees...

SHOW DAY

ON

VILLAGE TECHNOLOGY

SUNDAY 10th OCTOBER

10am — 4pm

VUDAL AGRICULTURE COLLEGE

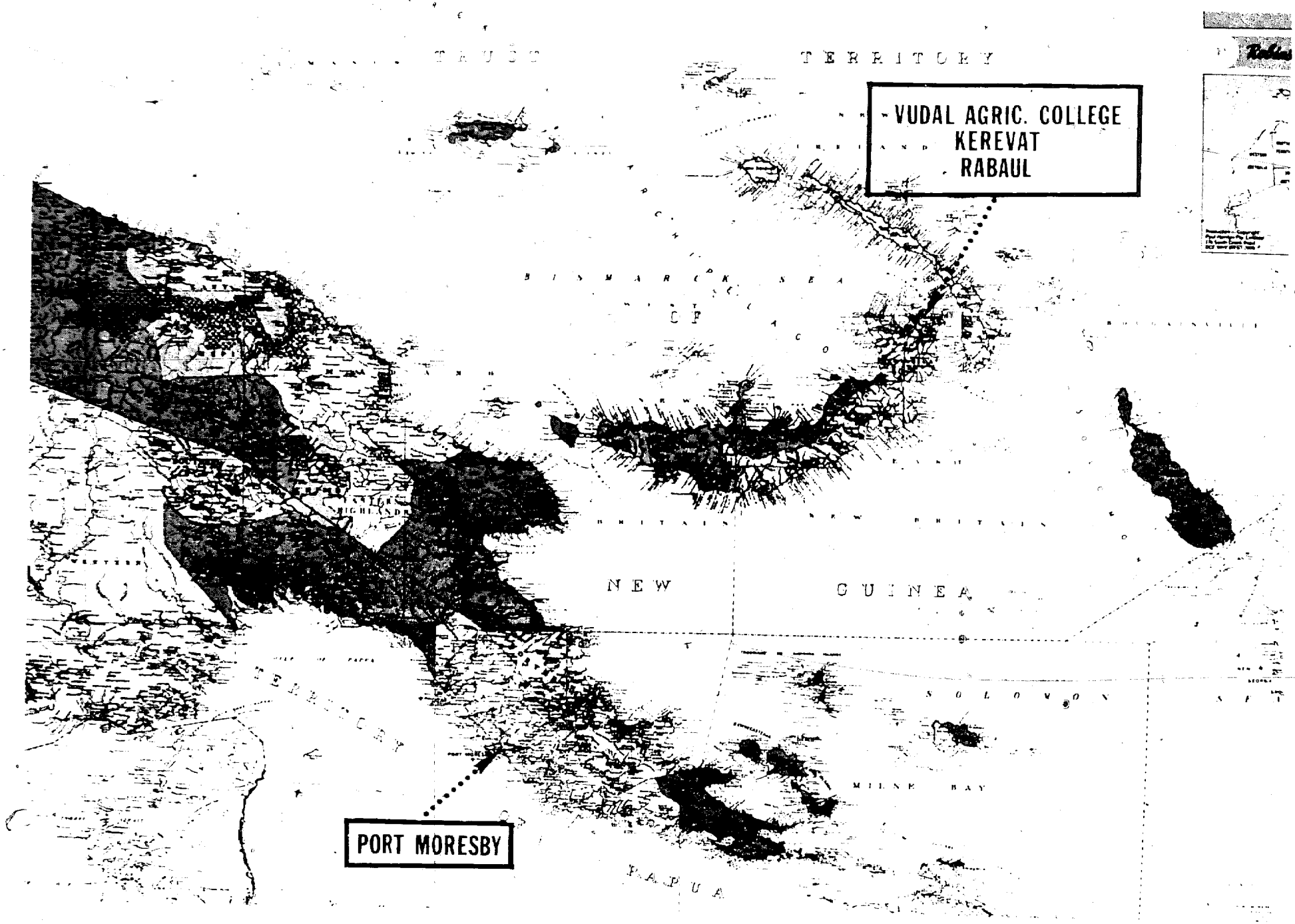
Following a three week workshop on appropriate technology the public is invited to attend the show day when demonstrations and exhibits of simple skills, machines, and projects for village development will be on display.

Demonstrations will include timber preservation, kaukau chippers, soap making, brick making, leather works, charcoal making, shingle making and various others.

OFFICE of VILLAGE DEVELOPMENT - DAG HAMMARSKJOLD FOUNDATION

'But, in my village, when I ate kau-kau (sweet potato), it was good because it was kau-kau that we had grown ourselves, on our land, land which our ancestors had looked after for us, and which they are still looking after. They had spent all their lives on it, had watched the growth of young trees, trees which were not giants, and they had discovered the best places to catch fish and to hunt, and they had sat under the big volcanic rocks when the heavy rain sometimes caught them. They knew where the caves were, and which places were inhabited by masalai (spirits). No wonder I felt secure, knowing that my ancestors were watching over me.

'But there were other reasons. Mainly it was the land. The land and the sea near my uncle's village provided us with everything we needed. In those days there were not as many trade stores as there are now, so my people had not learned to become as dependent on this foreign supply line as they are today. The land, my mother's land, gave me everything I needed. My food, my sleeping mat, the cloak my sister used when it rained, the tree from which my uncle cut my first little canoe, the bow and arrows my father made for me before I started going to school, these things all came from the land. Later I learned how to make rope, and which leaves to use for medicine, and many other things. I felt secure. I had everything I needed, and it all belonged to us, as it had always done. I suppose you have all felt this security, so you know what I mean....'


VUDAL AGRIC. COLLEGE
KEREVAT
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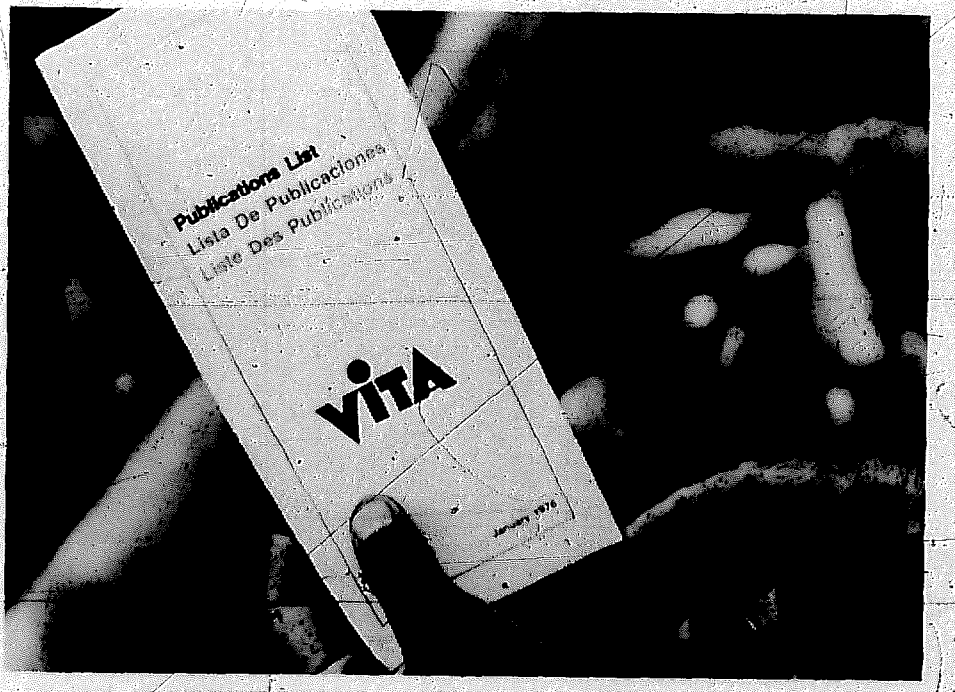

This report has not paid any regard to technical information about appropriate technologies because it is already available from so many excellent sources such as VITA (Volunteers in Technical Assistance). VITA is an association of 6,000 volunteer businessmen, educators, scientists and engineers engaged in technology transfer of a practical nature in response to requests from people in the underdeveloped areas of the world. VITA has printed information available on a wide range of ideas for appropriate technologies. Write to: VITA (Volunteers in Technical Assistance), 3706 Rhode Island Avenue, Mt Rainier, Md 20822, USA.

Another excellent source of technical ideas and information is the journal *Appropriate Technology*, Intermediate Technology Publications Ltd, 9 King Street, London WC2E 8HN, England.

For further information about the work of the Office of Village Development and the scope of the workshop programme, write to: Office of Village Development, P.O. Box 6937, Boroko, Port Moresby, Papua New Guinea.

PEOPLE WHO WERE THERE

PARTICIPANTS

Dauncey Aila
Adviser to Area Authority
c/o Provincial Officer
DARU, Western Province, Papua New Guinea

Aiyuto Aiyako
Rural Development Officer
Department of Primary Industry
KAINANTU, Eastern Highlands Province, Papua New Guinea

Aaron Bea
Student
Theological College, Rabaul, PNG
United Church
MUNDA, Western Solomons, Solomon Islands

Kenny Digmai
Adult Education Officer
P.O. Box 2070
JAMBA, Madang Province, Papua New Guinea

David Drayeu
Development Fellowship Holder
P.O. Box 98
LORENGAU, Manus Province, Papua New Guinea

Poiyo Dubo
Community Development Officer
Community Development Office
P.O. Box 1327
LAE, Morobe Province, Papua New Guinea

Wasam Alvin Gabara
Rural Development Officer
Manggai Provincial High School
Private Mail Bag
KAVIENG, New Ireland Province, Papua New Guinea

Saa Galilee
Development Fellowship Holder
c/o District Office
WAPENAMANDA, Enga Province, Papua New Guinea

Barigi Gese
Social Development Officer
Community Development Office
MENDI, Eastern Highland Province, Papua New Guinea

Hunty Gewa
Corrective Institute Service
P.O. Box 171
RABAUL, East New Britain Province, Papua New Guinea

Lionel Handu
Rural Development Worker
Christian Community Centre
Papaki Village
P.O. Box 201
POPONDETTA, Northern Province, Papua New Guinea

John Kanadi
Development Fellowship Holder
Catholic Mission
Kurada Post Office
SAMARAI, Milne Bay Province, Papua New Guinea

Michael Kapoto
Community Development Officer
Port Moresby Community Development Group
P.O. Box 4889
UNIVERSITY (PORT MORESBY), Papua New Guinea

John Knawy
Community Development Officer
Community Development Office
P.O. Box 8
WEWAK, East Sepik Province, Papua New Guinea

Ogan Kom
c/o Savings and Loan Society
P.O. Box 46
KUNDIAWA, Chimbu Province, Papua New Guinea

Willie Korisa
Student
Theological College, Rabaul, PNG
Presbyterian Church
LENAKEL, Southern District, New Hebrides

Opai Kunangel
Community Development Officer
Community Development Group
c/o Provincial Office
MT HAGEN, Western Highlands Province, Papua New Guinea

Daniel Kunja
Rural Development Officer
Bagi Agricultural Centre
P.O. Box 65
ANGORAM, East Sepik Province, Papua New Guinea

Samson Mangot
Adult Education Officer
Provincial Education Office
LAE, Morobe Province, Papua New Guinea

Simeon Mark
Pastor
Post Office
SALAMO, Milne Bay Province, Papua New Guinea

James Mohi
Business Development Office
KEREMA, Gulf Province, Papua New Guinea

Anna Nombri
Community Development Officer
Savings and Loans Society
P.O. Box 46
KUNDIAWA, Chimbu Province, Papua New Guinea

Raphael Oraka
Development Fellowship Holder
Free Mail Service
LESE OALAI, Gulf Province, Papua New Guinea

James Pandi
Rural Development Officer
Department of Primary Industry
JOSEPHSTAAL, Madang Province, Papua New Guinea

Manasa Radrotini
Rural Development Worker
c/o YMCA
Box 1412
SUVA, Fiji

Mike Ding Takip
Rural Development Worker
Yangpela Didiman Centre
P.O. Box 39
BANZ, Western Highlands Province, Papua New Guinea

Stephen Elavo Toivita
Community School Teacher
Vunadidir Community School
P.O. Box 922
RABAUL, East New Britain Province, Papua New Guinea

Jack Tungon
Pastor, Church Worker
UTAS, South East Ambrym, New Hebrides

Yaba Walaga
Church Worker
Highland Christian Mission
Yagusa Valley, Okapa
Private Mail Bag
GOROKA, Eastern Highlands Province, Papua New Guinea

INSTRUCTORS

Leo Aisi
Assistance Experimental Officer
DPI Fisheries
Kanudi
P.O. Box 2417
KONEDOBU, Papua New Guinea

Moi Avei
Extension Studies, UPNG
P.O. Box 4820
UNIVERSITY (PORT MORESBY), Papua New Guinea

Ian Donald
Engineer Primary Industry
DPI Development Engineering
P.O. Box 2417
KONEDOBU, Papua New Guinea

Claro Hidalgo
Business Development
Small Industries Centre
P.O. Box 5961
BOROKO, Papua New Guinea

Fred Keating
Technical Teacher
Goroka Technical College
P.O. Box 556
GOROKA, Papua New Guinea

Jean Kekedo
Director
Office of Village Development
P.O. Box 6937
BOROKO, Papua New Guinea

Johannes Kundal
Nutritionist
Nazarene Mission
P.O. Box 456
MT. HAGEN, Papua New Guinea

Col Levy
Forest Product Research Centre
P.O. Box 1358
BOROKO Papua New Guinea

Noel Lewis
Executive Officer
Office of Village Development
P.O. Box 6937
BOROKO, Papua New Guinea

Bernard Narakobi
Chairman
Law Reform Commission
PO Wards Strip
PORT MORESBY, Papua New Guinea

Oscar Natera and staff
Vudal Agricultural College
Post Office, Kerevat
RABAUL, Papua New Guinea

Caroline Parson
Nutritionist
Nazarene Mission
P.O. Box 456
MT. HAGEN, Papua New Guinea

Tony Power
Appropriate Technology Consultant
Office of Village Development
P.O. Box 6937
BOROKO, Papua New Guinea

Ume Wainetti
Projects Officer
Office of Village Development
P.O. Box 6937
BOROKO, Papua New Guinea

Waterhouse Waiwai
Senior Project Officer
Office of Village Development
P.O. Box 6937
BOROKO, Papua New Guinea

Peter Williamson
National Planning Office
PO Wards Strip
PORT MORESBY, Papua New Guinea

Brogan Zaneky
Officer in charge
DPI Forests Station
Kerevat
P.O. Box 406
RABAUL, Papua New Guinea