DGD-9 Research Trials in Rural Nepal P.O. Box 1615 Kathmandu, Nepal February 29, 1980

Mr. Peter Martin Executive Director Institute of Current World Affairs 4 West Wheelock Street Hanover, New Hampshire 03755

Dear Peter,

The deterioration of the Himalayan forests has received widespread attention in the international press during the last few years. Much of the blame for the worsening condition of the hill forests has been directed to the peasants who must depend on forest resources for fuel, fodder and building materials as well as new cropland. In hopes of alleviating the pressure on already diminished and degraded forest lands and increasing the productivity and income levels of rural populations, many development planners have advocated the introduction and expansion of small-scale industry in rural areas. During my first few months studying forestry issues in Nepal, I discovered that throughout the countryside the processing of agricultural and forest products plus many cottage industries are dependent on wood fuel* as their primary, if not sole, energy source (Cf. DGD-6). Indeed, with the progressive price hikes and supply irregularities of conventional petroleum fuels in recent years, it is not uncommon to find fledgling Third World industries reverting to cheaper, locally available wood fuels. In order to highlight the dependence on forest resources of much of Nepal's small-scale industry, I initiated in the spring of 1979 under the auspices of the Research Center for Applied Science and Technology at Tribhuvan University in Kathmandu, a research project entitled "Wood Fuel Utilization by Small-scale Industry in the Hill Region of Nepal." The major objectives of this research effort are to identify those industries dependent on wood fuel and to define their energy requirements. Secondarily, the project seeks to investigate the economic and environmental impacts of industrial wood fuel use on household consumption patterns. Finally, a brief survey of the energy supply options available to small-scale industry and the feasibility of introducing alternative energy technologies is planned.

[&]quot;In this paper the term "wood fuel" is used to encompass all traditional fuels of wood origin, including firewood collected in the forest or purchased from street hawkers or fuel depots, wood wastes collected from timber harvesting, milling and furniture manufacturing, and charcoal.

When the research proposal was originally submitted to university officials, nine wood-fueled industries had been identified and proposed for study. After several months of investigation, however, my list of industries using wood fuels had expanded to more than thirty. The current, although by no mean final, roster of wood-fueled industries in Nepal is given in Table 1. Initially an industry-oriented approach was planned, but due to the scarcity of information regarding industrial location, production and fuel utilization, it was necessary to redesign the project to a geographic focus. Subsequently, several study areas were chosen according to the following criteria:

(a) distribution and type of industry;

(b) existence of previous socio-economic studies for the area:

(c) bioclimatic zone;

(d) political development region designation; and

(e) accessibility.

The various survey sites selected — Surkhet district, Mustang district, Kaski district, Rasuwa-Nuwakot districts, Makwanpur district, Solukhumbu district, Ilam district and Kathmandu Valley, including Lalitpur (Patan), Bhaktapur(Bhadgaon) and Kathmandu districts— present a cross-section of economic and ecological conditions in Nepal and provide a wide variety of industries for review. Within these eight study areas it is expected that some 35 different industries can be investigated.

During the last three months of 1979, my assistant and I travelled to several of the specified study areas, including Surkhet, Mustang, Kaski and Ilam districts. The purpose of these field trips was to gather firsthand information regarding fuel use of various small-scale industries. To this end we visited many different production sites and interviewed factory owners, teashop proprietors, innkeepers, forestry officers and local government planning officials. In addition, we spoke with the managers of non-conventional energy sources, such as solar panels, biogas plants and small-scale hydroelectric facilities. The problems associated with the survey technique chosen and the difficulties encountered in data gathering in rural Nepal are explored in the following pages. Presentation of the results and conclusions of the survey is postponed until all of the study areas have been visited and the entire survey completed.

Preparations for Field Research

Much of the information used to prepare the industry list on the following page was gleaned from personal conversations, as well as farm management surveys, district development reports and industrial feasibility studies. Even the most informative publications, however, were more than five years old. Curiously, one of the most helpful publications has been a book dating from 1908, which describes the commercial products of India at the end of the last century. After several weeks of intensive research in government offices and libraries, it became readily apparent that reliable data could only be obtained at the production site, where the manufacturing process could be observed and the use of wood fuel verified and quantified. Consequently, an extensive field research program was planned.

Table	1.	Industries	Consuming	Wood	Fuels
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Nepal

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1973/74

()riginating Sector	Product or	Service
1.	Minerals	Ore Smelting Bricks* Lime* Pottery* Tile*	Blacksmithy* Jewelry* Metal craft(copper, brass, bronze)* Aluminum utensils Candles*
2.	Forest	Charcoal Chiuri ghee (oil) Paper* Medicinal herbs Katha*	Smoked fish Lumber drying Matches Nettle cloth
3.	Livestock	Cheese Ghee (butter)	Wool washing and dying* Leather tanning
4.	A griculture	Beaten rice Cardamon* Ginger, dried Alcohol* Sugar Peanuts, roasted* Tobacco, cured Turmeric, dried	Bakery goods* Cigarettes Candy* Fiber & textile dying Jute processing Oil seed processing Soap* Vinegar
5.	Horticulture	Wine and brandy* Fruit juice and syrup* Fruit jam*	Canned fruit Tea*
6.	Service & Miscellaneous	Teashops* Hotels & inns* Restaurants	Laundries Tailors* Road Construction*

* Industries which have been observed to date.

Sources: Central Bureau of Statistics. 1975. Census of Manufacturing Establishments. HMG Nepal National Planning Commission Secretariat, Kathmandu.

> Pandey, S.B. 1974. Identification of Fuel Problem in Kathmandu Valley. National Planning Commission Secretariat, Kathmandu.

Personal conversations and observations.



Figure 1. Map of Nepal with Survey Areas shaded.

For the purposes of data collection a personal interview format was chosen. This technique seemed best suited to the collection of a large amount of information from a diverse group in a fairly short period of time. The survey program planned resembles only superficially the traditional social science survey based on a random sample of a large, fairly homogenous population. In this project the population under investigation is yet to be fully defined. It is a multifarious group whose only common characteristic known is the utilization of wood fuel. Selective sampling was necessary to ensure the broadest representation of wood-fueled industries. Constraints of time and accessibility further required that research efforts be limited and focused in a few geographic areas.

Designing an interview schedule to function basically as a conversational guide was more complicated than initially anticipated. Questions must be presented clearly and concisely and in colloquial syntax. They should follow in logical order and be worded to set the scene, so to speak, in an effort to jog the respondents memory. Moreover, it is very important to frame inquiries in terms and categories that reflect the villagers' mode of conceptualizing their environment. Often it is difficult to obtain accurate quantitative data due to the lack or misuse of standardized measures in rural areas. Although it may be convenient to employ local units of weight and volume, one should be aware that conversion ratios for expression in international measurement units should be reworked several times a year. Volume to weight ratios often vary from village to village, region to region and season to season. Time and distance are two additional variables presenting measurement problems, especially in a country where the average rural inhabitant does not own a timepiece and has little use for kilomters or miles.

Probably the most influential feature of the entire survey process is the interview setting. Experienced researcher, Gerald Hursh-Cesar, posits that the 'most damaging elements are not unequivalent measures but unequivalent conditions." The interview process which singles out an individual, placing him or her in the limelight of confrontation with outsiders brandishing printed questionnaires, is a very unnatural situation for most people. especially rural Nepalis. It appears that some respondents never fully accept the surveyors' claims of affiliation or lack of influence. Fear and mistrust motivate some respondents to misrepresent their situation or experiences. Dreading reprisal, an informant often responds in a manner least likely to jeopardize his position or his possessions. Conversely, many respondents provide answers they believe may bring advantage to themselves, their family or their community. Some strive to bias information to discredit rival factions. Occasionally, sensing a sympathetic listener, a villager will attempt to corner the interviewer in an effort to air personal grievances. often with great drama.

The desire to be courteous to strangers appears to present a strong source of survey bias in Nepal. Notoriously friendly and generous, Nepalis find it much more pleasant to agree with their guests than reply negatively. I found it very difficult in many cases to secure a precise differentiation between "No, it is not so" and "I do not know", an answer which might be thought to threaten one's self-esteem. Sometimes we felt that the reply given was more socially or politically desirable than correct. At times there appeared to be an effort to present a facade of modernity; a few individuals preferred to guess weight, volume or distance in international measurement units rather than to report what they probably knew with greater confidence in traditional units.

Subconsciously an informant biases his responses by his mood, which in turn is affected by current events and recent personal experiences. Political and economic conditions can be particularly influential. Even where memory lapse may not present serious problems, a preoccupation with local, and perhaps very transitory, conditions may focus respondents too narrowly on the near term. For example, in the dry season, farmers' main concerns are water scarcity and crop failures, whereas in the wet season, adequate drainage, unpassable trails and inaccessible markets may be foremost in peasants' minds.

Despite these almost inevitable biases which to some degree flaw the final research results, the personal interview method of data collection still has much to recommend it. A relaxed and yet persistent attitude on the part of the investigator will yield undoubtedly better results than an anonymous questionnaire delivered by the mailman. Moreover, the personal assurances and encouragement

of a sympathetic interviewer may be able to coax an otherwise cautious, hesitant respondent into generous cooperation. A visit to the actual production facilities and observation of the manufacturing process under investigation may discourage gross falsification of data and certainly increase's the surveyors' ability to assess the quality of the information presented. The alert interviewer learns to detect obvious informant biases and subsequently may be able to amend the interview schedule to correct for these influences. It is acknowledged as well that the investigator himself, or herself, may be a source of survey bias. The interviewer's appearance, attitude, personal habits and manner of speech may elicit a particular response from informants. (Certainly, I myself, as a fair-skinned, western woman sporting short hair and blue jeans, was the subject of great curiosity in some of the more remote areas.) Proper selection, training and monitoring of survey enumerators is the only way to combat the problem of interviewer impact.

Field Survey Experiences

The areas chosen for fieldwork last fall were Mustang district in the north central Himalayas, Ilam district on the far eastern border and Surkhet district in the foothills of the far western region. (See Figure 1) Between trips to these distant areas we were able to complete several interviews in Kathmandu valley and Kaski district. Having prepared the survey questionnaires during the summer rainy season, we were ready to move into the hills as soon as the monsoon flood waters receded and flights to remote areas resumed in the fall. Despite our judicious preparations, getting to the survey site via public transportation — where it exists was no mean feat. Delayed departures and dirty, crowded conditions were the norm.

After establishing a base in the study area, our first task was to locate local government officials in order to introduce ourselves and explain the purpose of our visit and the objectives of our project. Additionally we would request assistance in locating the local manufacturing establishments whose names we had collected in Kathmandu as well as in identifying other rural industries using firewood or charcoal. The proprietors of village teashops, a common meeting place for local businessmen and labourers alike, often were very helpful in pointing out the local wood-fueled factories. Conversations with village grocers revealed whether items such as soap, candles, jam and bread are imported or produced locally, and therefore probably with firewood. With our work thus defined and our pockets stuffed with treats — cigarettes for the adults and oranges, balloons or candy for the children — we would set off in search of the often inconspicuous local factory.

Typically an interview with a manufacturer would take place in the yard or ramshackle office within or adjacent to his family residence. The nature of the production process and the scale of operations largely determined the location of the production site. For example, a goldsmith's shop is found usually on the ground floor of his house. Brick and lime kilns tended to be located near the source of the primary raw materials, generally at some distance from the owner's residence. The larger bakeries often are established next to the family dwelling, although in a few instances we observed the ovens actually within the residence. Although not commonly thought of as cottage industries, such backyard operations constitute a large portion of the manufacture of rural Nepal. Agricultural implements, pottery, jewelry, candles, soap, bread and alcohol are a few of the products I observed in production in the hill region.

During most interviews I found that my assistant and I were not alone in our discussions with the factory owner or manager. A variety of individuals, including family members, employees, neighbors and even mere passersby, could be found eaverdropping on our conversations at one time or another. Occasionally they would interject their opinion as well. It is difficult to assess the impact of these sometimes very vocal observers on the quality of our informants responses. The presence of an audience very likely would prompt a respondent to portray his situation in the most favorable light, but on the otherhand it also might inhibit the outlandish exaggeration of fact,

The broad interests of the research program called for discussions with a wide variety of individuals, including factory owners, inn and teashop proprietors, local government planning officials and forest department field staff, among others. Almost without exception numerical data of any sort was difficult to obtain. Records, when existent, were often outdated, incomplete and incongruous over time. Preliminary research in Kathmandu had failed to produce significant quantitative results; the hope that the desired data was only absent from the capital due to communications problems and that it, in fact, existed in district offices was soon firmly quashed. The major stumbling blocks in our field survey stemmed from difficulties encountered in data collection regarding industrial output and woodfuel measurement.

A. Industry-related problems

One of the first things that becomes apparent when investigating industrial sector in Nepal is that it is often very difficult the to identify a sufficient number of sample production units in any industry to render survey data analyses statistically meaningful. Consequently, generalization from most industrial studies in Nepal is probably of dubious value. For the less sophisticated, smallscale industries bookkeeping regarding raw material and operating costs and even sales seems to be haphazard at best. Discussions with various individuals indicated that management skills, gained largely by trial and error, are passed on with little modification from father to son. The numerous deletions and amendments necessary to the district lists of manufacturing establishments issued to us by the Departments of Industry and Cottage, Village and Small Industries in Kathmandu demonstrate that government registrars cannot keep pace with the rapid changes in the industrial sector. I was told, however, that it is not unusual for an entrepreneur to file the name of a prospective factory together with a feasibility study to government authorities solely for the purpose of obtaining a business loan which subsequently will be used for personal purposes. In such cases actual production may never materialize.

Manufacturing periods, even for the older, established factories, appear to be highly irregular. Vagaries of weather affect crop production and, hence, agricultural processing periods. Both tea and cardamon output declined last year due to regional drought. A candlemaker attributed his decrease in production to inadequate supplies of parafin, an imported item. In Surkhet valley, brick and lime production have been delayed this season due to excess inventory remaining from last year. Export of the surplus is difficult on account of the rudimentary condition of the sole road connecting this western valley to larger markets of the Terai and northern India. Furthermore, it appears that in some instances manufacturing may be only a sideline interest for a businessman whose primary occupation is farming. For such individuals, industrial production continues only so long as profit margins are very high and management activities do not interfere with agricultural responsibilities.

In each of the areas visited a universal dread of the tax collector appeared to hinder our attempts to secure accurate production and revenue data. Moreover, a reluctance to participate in our survey could be associated to distinct industries or commercial establishments for various reasons. Distillery operators, for example, were reticent to provide output statistics, very likely because they are fearful of contradicting estimated production figures submitted to government authorities in previous bidding for a government liquor license. Blacksmiths also appeared uncomfortable in being singled out for interviews, perhaps, on account of their low caste status or their traditional, and now suspect, role as charcoal makers. Likewise, women, operators of teashops and lodges, seemed embarrassed to talk with us. Whenever possible they deferred to male members of the household. Often the women continued to work nearby, however, and would interrupt with a comment when obviously they thought their spokesman had responded incorrectly or incompletely.

B. Forestry-related problems

Although not as sensitive an issue as the more popular survey topics of family planning and farm management, the study focus on wood-fuel utilization did give rise to some degree of apprehension among those individuals questionned. Due to the rapid deterioration of Nepal's national forests during the last decade, the consumption of firewood and charcoal recently has come under scrutiny by government officials. In some districts where forest preserves have been established, local villagers now must obtain special permits to cut wood in areas which once were their common fuelshed; in Surkhet valley townspeople who have access to government fuel depots are denied such permits. Government forest regulations subject to enforcement by an inadequate, ill-equipped staff of field officers have had only limited success, however, in halting forest destruction. To our questions regarding forest utilization, I often felt informants gave a politically appropriate response rather than actual fact. Manv times individuals were hesitant to name their suppliers or geographical source. In several instances we were told to return at dawn if we wanted to talk with the charcoal producers. Fearful of government surveillance these people carry their loads into the cities and towns under the cover of early morning darkness. They sell their product

directly to jewelry designers, blacksmiths and brass and bronze craftsmen, as well as charcoal vendors. I have been told that the high quality charcoal required by some metal workers now must come from as far away as Tibet.

With regard to securing information on wood-fuel production and consumption, difficulties in measurement created the most significant problems. As expected statistics on fuelwood production are practically nonexistent. Historically forest production has been evaluated in terms relevant only to lumber manufacture. The quarry of the firewood cutter with a simple hand-axe, however, is often the smaller diameter (ten centimeters and less) poletimber and branches, almost precisely that which escapes appraisal by traditional forestry mensurational techniques. In Nepal very often the larger diameter forest trees remain standing to surrender their branches year after year for fodder, fuel and building poles. (Note the larger trees in the background of Figure 2.)

Although estimates abound, genuine wood-fuel consumption figures are almost as rare as production figures. With the exception of sales by the government Fuel Corporation (estimated to provide only about one-fourth of the fuelwood consumed in Kathmandu Valley) very little firewood passes through commercial channels and is subject to regular record keeping. Generally, fuelwood is collected by household members mainly women and children, for their own use. In certain areas in Nepal, however, the cutting, distribution and sale of firewood provides substantial income for some families during the agriculturally slack winter season.

When possible to obtain data on wood-fuel utilization, the quantities are often given in local units of volume. Although all sizes of bundles and piles of firewood were noted, the most frequently encountered measures were the <u>bhari</u> and the <u>chatta</u>. The <u>chatta</u>, commonly used by larger consumers who buy directly from the Forest Department or a private timber contractor, is a neat stack of logs measuring roughly five feet high, five feet wide and twenty feet long (500 cubic feet) and containing approximately seven tons of wood. (See Figure 3.) The <u>chattas</u> observed in Surkhet tended to have a high proportion of irregular logs which reduces the amount of solid wood actually contained in the measure.

The term **b**hari", a very common unit of measurement in Nepal, is used to decribe a load of any commodity carried on the shoulders. A <u>bhari</u> of fuelwood may be anything from a one meter section of log to a bundle of twigs. In most instances a firewood <u>bhari</u> is composed of split log pieces and small branches tied into a cylindrical bundle measuring roughly 80 centimeters long and 40 centimeters in diameter. (Note the pile of such bundles in the background of Figure 4.) His Majesty's Government of Nepal has determined that the standard <u>bhari</u> weighs 37.50 kilograms. Indeed, the first <u>bhari</u> of firewood we measured weighed exactly 37.50 kilograms, much to our astonishment. Subsequently, however, we found considerable disparity in <u>bhari</u> weights; in one wood pile in Ilam we documented a difference of almost twenty kilograms between two <u>bharis</u>. Under field conditions wood weight is the most convenient indicator of heating value, which is closely correlated with wood density or specific gravity at a constant moisture content.



Figure 2. Interview at a lime kiln in Surkhet valley

Figure 3. One <u>chatta</u> of wood(from my assistant in the center to the foreground) is about two-thirds of the amount of fuel required for one firing of the lime kiln in Figure 2 above.





Figure 4. A husband and wife making bricks in Ilam. The bundles of wood in the background will be used to fire their 12,000 brick kiln.

Apart from the usually slight variation in bhari dimensions, fluctuation in bhari weights appears to be primarily a function of three factors: (a) species composition; (b) moisture content; and (c) wood form. The range of tree species represented in a bhari of firewood will vary by region due to the wide diversity of forest types in Nepal; species mix also may vary by season on account of forest inaccessibility. Moisture content will vary by species due to internal wood structure; in addition it will fluctuate by region and season as a result of differences in climate and local weather conditions. The form of the wood, that is, twigs, branches or split logs, composing the bhari will be determined largely by availibility. The more irregular the form of the wood collected, the less actual wood can be carried in a bhari of given dimensions. The solid wood content of a bundle of twigs and small branches, for example, is much less than a similar sized bundle of relatively uniform split logs. On several occasions we noted that the purchase price of a bhari of fuelwood was not strictly a function of its weight. Prices paid appeared to reflect not only the bargaining abilities of both buyer and seller, but also any special relationship, such as familial ties, frequent purchases, or an unwritten long-term contract, between the the two persons.

With so many variables influencing weight and consequently calorific value of the common unit of firewood measurement, an accurate assessment of actual wood-fuel consumption and energy requirements is no simple matter. For a commercial or manufacturing establishment, a precise definition of the technology employed plus repeated measurement of fuelwood. used in the production process, preferably over several years, would be desirable. It is recognized that, among other factors, the scale of operations, ambient temperature and humidity, quality of workmanship evidenced in stove, oven or kiln construction and the skill and thriftiness of the production manager are important variables affecting wood-fuel requirements. In Nepal, I expect, the limited number of production units in any given industry precludes a sample survey large enough to isolate or obliterate the effect of these several factors.

To the problems of volume and weight measurement may be added the difficulties of securing accurate quantitative data on the variables time and distance. We were interested in the source of firewood, specifically, from which forest it was collected, and the length of time it took to collect it. In the hills of Nepal, rugged terrain and primitive bridges and trails render time a more meaningful measure of distance and effort than miles, kilometers or other linear One notices that these distance measures will vary from scales. season to season due to the effects of weather on trail conditions. In addition, we recognize that in many instances fuelwood collection may not be the sole objective of a foray; fodder, fruits, nuts and herbs may be gathered during the same trip. The peer group socializing occurring during these chores appears to be an important aspect of the outing as well. To allocate a quantity of time to these various tasks and assess what proportion should be attributed strictly to firewood collection is extremely difficult, if not impossible. Unfamiliar with clock time. most rural villagers have problems in gauging their work in terms of minutes or hours. Estimates can be taken in

fractions of days, but where the definition of day corresponds to hours of sunshine, difficulties arise. The seasonal variation in the number of daylight hours increases as distance from the equator increases; in the high mountains of Nepal these variations are exaggerated between valley and crest by the enormous altitudinal differences.

Refining the Research Method

Checking and rechecking is the best way in which to test the reliability and consistency of field survey data. Ideally, remeasurement should be made by research assistants posted in the study area for an extended period of time or visiting the area at regular intervals. Alternatively a second, similar questionnaire administered several weeks or more after the initial interview could verify consistency of informants responses. Although return visits to selected sites are planned, constraints of time and money prohibited the employment of the numerous staff or the dedication of several years necessary to carry out an intensive program of rechecking. Consequently, checking procedures were incorporated into both the questionnaire and the interview process. More specifically, the survey form guided the interview through a series of questions regarding industrial production and fuel consumption; after approximately one hour and 45 questions, the conversation would culminate in a discussion of the size and shape of the establishment's stoves, ovens, kilns or kettles. Almost invariably this exchange led to a tour of the manufacturing site. At the site with the formal interview schedule tucked away, I posed questions regarding the details of the production process, especially quantities of inputs and outputs handled during a typical day or production period. Meanwhile in the background, my assistant would be furiously scribbling notes on the conversation. Finally, I would take the dimensions of the wood burner we had observed, weigh the wood prepared for the fire and snap a few photographs. The information gathered at the factory would be compared later to the data collected on the questionnaire administered in the office. The photographs are useful not only as a record of the details of the production site, but as a ploy to facilitate a second interview with the factory manager should the two sets of figures be found to be widely divergent.

In general, the interests and activities of our survey team were welcomed by the individuals contacted. For the most part, I am satisfied with the interview format developed and the information derived thereby. The on-site, personal interview method of data collection afforded us the opportunity of tailoring our questions to suit the varying conditions of the different industries visited. Only a few questions of the basic interview schedule must be reworded or eliminated, I feel. Curiously enough, the question eliciting the most amazement and amusement was:

"If fuelwood is not available, what will you use instead?" Even in those areas where people realize that with each new year they must walk progressively farther distances to collect fuelwood, the thought of having no wood at all seems very strange, almost inconceivable. Certainly for most of Nepal's rural inhabitants, the immediate problems of drought and food shortages far overshadow the sad prospect of no firewood five or ten years hence.

Summary and Conclusions

The conflicting conclusions of two local energy sector studies plus my own observations of the extensive use of fuelwood in agricultural processing, manufacturing and service industries prompted this research into wood-fuel utilization by small-scale industry in Nepal. Preliminary investigations at government offices and libraries in Kathmandu has revealed that very little has been written regarding the energy needs of village and cottage industries. In order to determine the extent of rural industries' dependence on wood fuel, a survey of various factory operations and commercial enterprises was undertaken in selected regions of Nepal.

At the present time about fifty percent of the survey work has been completed. Poorly kept records and non-standardized measurement units, however, have made numerical data collection a continual The figures collected are, for the most part, estimates. challenge. Only the larger industries, for example, some bakeries and distilleries, could produce proper records. Due to time constraints the fuelwood measurements are single day samples rather than an average of several days samples taken at regular intervals throughout the production period. Moreover, the limited number of factories that could be visited in any given industry will make generalization difficult. Subjected to the rigorous mathematical exercises of traditional social science survey research, the data collected would very likely make a poor showing. We recognized at the outset, though, that sophisticated statistical analyses would not only be irrelevant but unwarranted. The evident need is for a broad-based. descriptive examination of the energy needs and supply options facing small-scale industry.

The emphasis on defining the milieu and not merely quantifying convenient economic variables hints of an anthropological influence. Indeed, the techniques of anthropological research — informal, unstructured interviews, participant observation, long-term assignments in selected communities — probably are better suited to the research demands of many developing countries. In those areas most in need of assistance, the isolated rural mountain regions of the Third World, often insufficient information exists to be able to design an effective survey questionnaire. Too many surveys are inflicted on peasants by well-meaning, but poorly informed, numerical wizards whose multiple-choice questions in tidy matrices are inadequate to describe the realities of life for rural inhabitants subsisting on the margin of modern civilization.

The information gathered by the research efforts described on the preceding pages is both very interesting and informative. But as with all figures, if taken out of context, abstracted from the basic assumptions of the research, the data can be as harmful as it otherwise can be helpful. Often I have seen the polished presentation by a prestigious publisher of rather dubious data accepted virtually as gospel. It must be remembered that statistics reflect their origin. In the remote rural areas, research, as everything else, proceeds under sometimes harsh and uncertain conditions; compromise and improvise are catchwords of the day, every **day**.

Despite the many difficulties detailed above, it is expected that the data derived from this research will add significantly to the body of knowledge regarding rural industry and energy consumption in Nepal. Certainly, however, it should be viewed as the first glimmer of light on the subject, hardly the last word. Preliminary results show very clearly that a vast amount of work needs to be done if the development of village and cottage industry in Nepal is to continue without adverse environmental consequences.

Sincerely,

Deanna G. Donovan Forest and Man Fellow